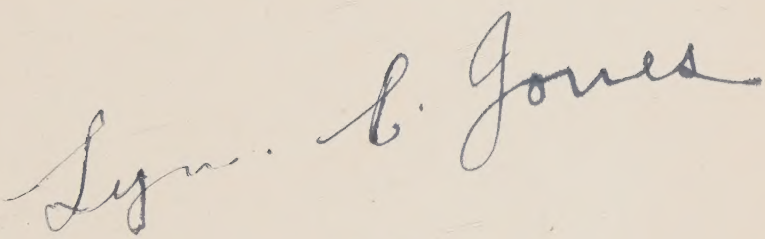

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MATERIAL Instinct is the same in all its different manifestations. When the eagle attacks the chamois kid, following its instinct to procure food for its young, the chamois, as shown in the illustration, employs all the powers of defence with which Nature has endowed her to save her little one. And no sooner does the eagle secure its prey than it flies off directly to its eyrie to furnish food for its eaglets, never stopping to think of feeding on it itself, any more than the chamois thought of anything but saving its young when attacked by the eagle.

Maternal Instinct

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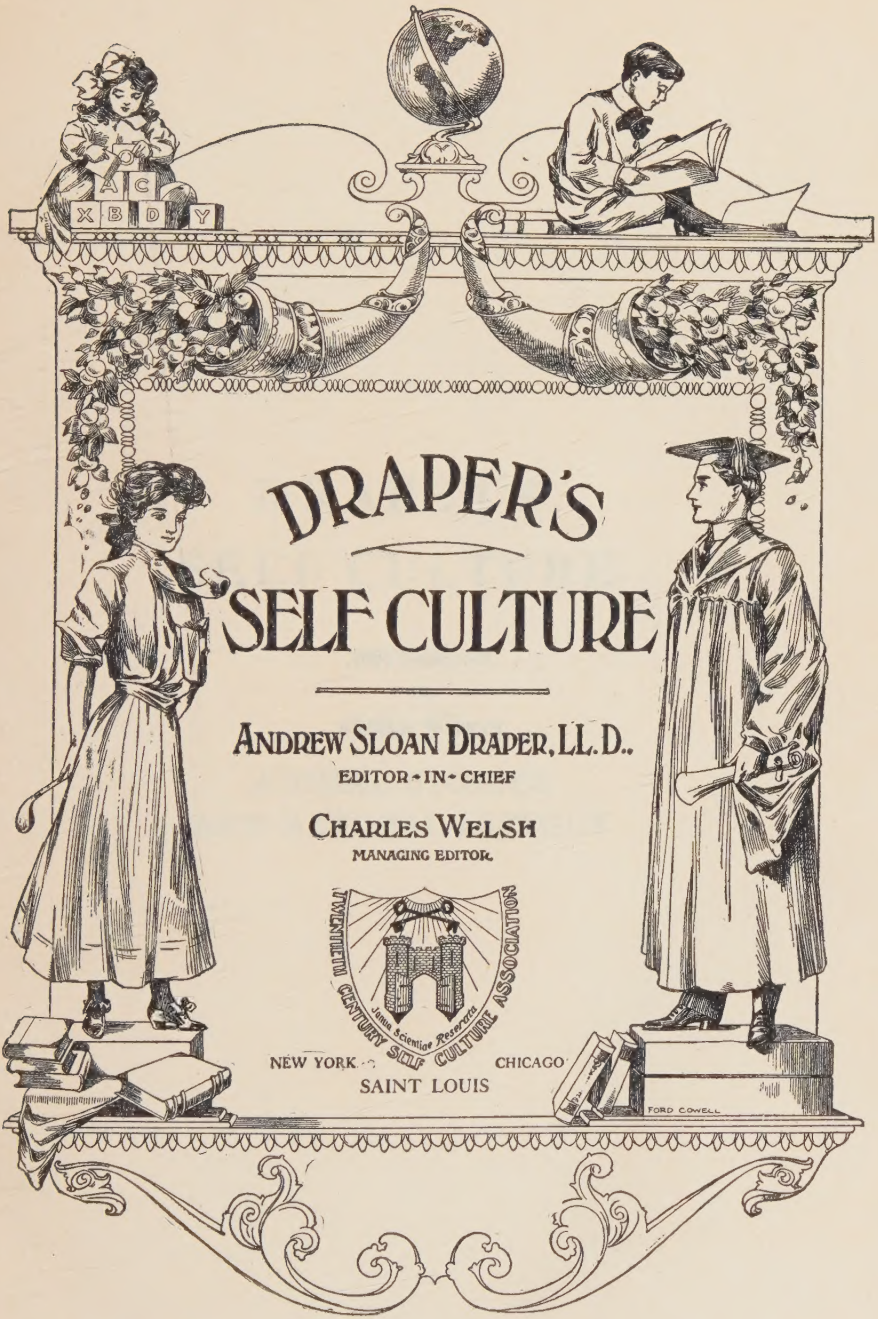

DRAPER'S SELF CULTURE

ANDREW SLOAN DRAPER, LL.D.,
EDITOR-IN-CHIEF

CHARLES WELSH
MANAGING EDITOR.

TWENTIETH CENTURY SELF CULTURE ASSOCIATION
Home Scientific Research

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DRAPER'S SELF CULTURE

VOL. III

ANIMAL STORIES AND NATURAL HISTORY

Lord of Bird & Beast

TO man is given dominion over the fish of the sea, the birds of the heavens, the cattle, and everything that has life. Let us see to it that we use this dominion and power aright.

DRAPER'S SELF-CULTURE

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(Commissioner of Education of the State of New York)
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INTRODUCTION.

BY

DAVID STARR JORDAN,

PRESIDENT, LELAND STANFORD UNIVERSITY.

[David Starr Jordan, LL. D., the President of Leland Stanford, Jr., University, is not only one of our greatest scientific authorities on Natural History, but has written some very acceptable stories of Animals and Fishes for the younger folk.]

It is the privilege of the present writer to say a word as to the scope and purpose of this book, in the compilation of which he has been interested.

It has been the purpose of the Managing Editor to bring together in the first section of the work stories which children may enjoy — true as to facts, but as to method related to "the time when animals could talk," a period in which every healthy child is naturally interested. It is a trait of the youth, of the individual man, as of the human race to endow the objects around him with human attributes. That dogs and monkeys should speak in a story is natural enough to the child, while at the same time the child knows well enough that it is "just a story," so far as the words are concerned.

In the second section are given series of chapters in natural history, interesting to children and grown-up persons alike. These refer to birds, mammals and insects of different sections of our own country and to various curious and out-of-the-way creatures inhabiting the remotest regions of the earth.

These are all written by men and women who know these things at first hand, and they will serve their best purpose in leading boys and girls to know the animals they meet, in the same thorough and helpful fashion. Every boy or girl in the country has ample opportunity for

this. All we know about living things is what somebody has seen, and the great observers, the great naturalists are men and women who have looked on animals or plants with greater patience than the rest of us. There is a joy and a strength in knowing things for sure, which repay a hundred fold all the time spent in investigation.

In this book considerable attention is given to the fascinating subject of protective resemblances in birds and insects. It is not claimed that the volume is a complete natural history or that any part of any subject has been exhausted. It is a book about some beasts, some birds, some insects and some fishes. It is put together on a plan of its own unlike that of the encyclopedias. It is intended to awaken, to stimulate and keep alive in young and old the interest in our fellow friends, the animals, and to show some of the marvels of animal life with which the earth abounds.

DAVID STARR JORDAN.

THE LOVE AND STUDY OF NATURE.

BY

Dr. G. Stanley Hall,

PRESIDENT, CLARK UNIVERSITY, WORCESTER, MASS.

[Granville Stanley Hall, LL. D., the President of Clark University, and Professor of Psychology, is the foremost authority on child psychology; he has written and lectured much on this important subject, and all that he says or writes on educational matters is worthy of most careful attention, for he speaks with authority.]

Flowers have a language all their own. The rose speaks of love, the violet of modesty, the lily of kingly beauty, the poppy of sleep, the ladies' slipper, honey-suckle, dewdrop, harebell, tulip, marigold, dandelion, hollyhock, jessamine, hyacinth, clover, buttercup, daisy,— all suggest at least, if we turn to their etymologies, how warm and close about the human heart flowers have always lain.

They have moral qualities, and illustrate psychological characteristics, brighten the earth and, therefore, the heart of man. Their fragrance suggests incense, the miracle of their relations to birds and insects, and their perfumes are the creators of special sentiments, and the best of all language of some and reflections of others.

The seer who plucked the flower from the crannied wall realized that, could he but know what it was, root and all, leaf and all, he would know what God and man were. While the human clodhopper is he for whom, as for Peter Bell, "the cowslip by the river's brim, a yellow cowslip is to him," and it is nothing more. The great kindergarten apostle lay one day, he knew not how long, gazing into the calyx of a yellow flower with black spots, and arose from his hypnotism by it a new man. Flower lore reflects all this childish stage, and teaches us how to begin instruction in this field, rather than, as is often done, to dull the apprehension and spontaneous childish interest by the technical methods and names of adult botany.

For the child the trees literally talk, as their leaves murmur in the wind. They hear and repeat the words by which they call the birds to alight on them, eat their fruit, build their nests in them, sing, scold, invite them to climb to their branches, etc. It is painfully cruel to

trim trees and shrubs, and often punishment to flowers to pluck them, and murder to pull them up. All this animism is a placenta by which nascent interest in nature is nourished and stimulated to grow toward maturity. While great care to furnish abundant pabulum in this direction should be taken, interference is mutilation of the budding soul.

So, too, with animals. The child's soul sees no chasm between pets and other human beings. The dog, cat, horse, and often all the rest of the animals within its ken, perceive, feel and think as the child does; are responsive to all its intentions and endeavors, and speak a language essentially different, but sometimes with plenty of human words in it; have souls that go to the animal if not to the human heaven; are perhaps even more companionable than parents or playmates; love, hate, fear, feel revenge, are good or naughty, quick or stupid to learn or understand, tired like the doll when the child is tired, eat, sleep and walk like, and sometimes with, their little human owners or companions, love to be dressed, to be carried, to ride, to have their toilets carefully made, to be decorated with ornaments, etc.

Indeed, we might almost define the animal world as consisting of human qualities broken up and widely scattered throughout nature, and having their highest utility in teaching the child psychology by a true pedagogical method.

The pig, to a child who knows its habits and what piggishness means, is a symbol of impetuous greed and gross selfishness not only in eating, but also in other matters of filth and untidiness, which gives the child with this familiarity a better conception, and a truer reaction to, all that these qualities mean in the world of man.

To say, of a woman, She is a butterfly or a peacock, describes traits which it would take a whole chapter to explain to one who was not familiar with these forms of animal life.

In the same way, the goose, the fox, the eel, the lion, bulls and bears, the eagle, the dove, the jay, the cuckoo, the hawk, the pelican, the crow, the serpent, the gazelle, the cormorant, the badger, wolf, tiger, elephant, alligator, fish, chrysalis and its metamorphoses, the bee, ant, wasp, the sloth, insect, the ape, hibernation, migration, nest-building and scores of others are psychological categories or qualities embodied and exaggerated so that we see them writ large and taught object-lesson-wise, to those who live at a stage when character is being moulded and influenced pro or con in each of these directions.

We might add a long list of more or less mythic animals or popular misconceptions of animal traits. The leviathan, the phœnix, the albatross, the tadpole, the frog, the centaur, the children's fancy in creating impossible new animals, is almost as fecund as nature herself.

Therefore we plead for menageries, for collections of animals in every public park, pets, a familiarity with stable, school museums of stuffed specimens, the flora and fauna of the neighborhood in every schoolhouse, to say nothing of instruction in every school concerning insects, birds, and animals which are noxious, and those which are helpful to vegetation, fruit and agriculture generally.

The story of the gypsy moth; the phylloxera; the caterpillar; the tobacco worm; the life-history and habits of other parasites in the bark or on the leaf, in seed or pulp, the marvelous habits of the botfly; the angle worm, through whose body all our vegetable mould has so often passed; the common house fly with its interesting and less ephemeral story than we would have thought; the grub; the wire worm; moth and bat; the food fishes; weeds; sorghum; ginseng; grasses; potato beetle; hemp; peach-tree borer; the apple aphis; the tent makers; and many other fascinating living creatures which have been so carefully studied of late in our agricultural colleges,— have a moral as well as a scientific interest to childhood, and make a kind of knowledge which has an educational to say nothing of an economic value, and which must be ranked as one of the very highest.

G. Stanley Hall.

THE DOG, MAN'S BEST FRIEND.

BY

GEORGE G. VEST.

[A speech by the late Senator Vest, of Missouri.]

The best friend a man has in this world may turn against him and become his enemy. His son or daughter that he has reared with loving care may prove ungrateful. Those who are nearest and dearest to us, those whom we trust with our happiness and our good name, may become traitors to their faith. The money that a man has he may lose. It flies away from him, perhaps when he needs it most. A man's reputation may be sacrificed in a moment of ill-considered action. The people who are prone to fall on their knees to do us honor when success is with us may be the first to throw the stone of malice when failure settles its cloud upon our heads. The one absolutely unselfish friend that man can have in this selfish world, the one that never deserts him, the one that never proves ungrateful or treacherous, is his dog.

A man's dog stands by him in prosperity and in poverty, in health and in sickness. He will sleep on the cold ground, where the wintry winds blow and the snow drives fiercely, if only he may be near his master's side. He will kiss the hand that has no food to offer, he will lick the wounds and sores that come in encounter with the roughness of the world. He guards the sleep of his pauper master as if he were a prince. When all other friends desert he remains. When riches take wings and reputation falls to pieces he is as constant in his love as the sun in its journey through the heavens. If fortune drives the master forth an outcast in the world, friendless and homeless, the faithful dog asks no higher privilege than that of accompanying him to guard against danger, to fight against his enemies, and when the last scene of all comes, and death takes the master in its embrace and his body is laid away in the cold ground, no matter if all other friends pursue their way, there by his graveside will the noble dog be found, his head between his paws, his eyes sad but open in alert watchfulness, faithful and true even to death.

THE ART OF SEEING THINGS.

BY

JOHN BURROUGHS.

Author of "Wake-Robin," "Squirrels and Other Fur Bearers," etc.

[John Burroughs is one of our most sympathetic observers and interpreters of Nature in all its varied aspects, and his essays, written on his farm while devoting himself to fruit culture, are great favorites with all lovers of life out doors.]

The book of nature is like a page written over or printed upon with different sized characters and in many different languages, interlined and cross-lined. There is coarse print and fine print; there are obscure signs and hieroglyphics. We all read the large type more or less appreciatively, but only the students and lovers of nature read the fine lines and the footnotes. It is a book which he reads best who goes most slowly or even tarries long by the way. He who runs may read some things. We may take in the general features of the sky, plain, and river from the express train, but only the pedestrian, the saunterer, with his eyes in his head and love in his heart, turns every leaf and peruses every line. One man sees only the migrating water-fowls and the larger birds of the air; another sees the passing kinglets and hurrying warblers as well. For my part, my delight is to linger long over each page of this marvelous record, and to dwell fondly upon its most obscure text.

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ANIMAL STORIES AND NATURAL HISTORY.

A PUPPY'S FIRST LESSONS.

DOGS? Well, I should say there were dogs: dogs of every size, of every shape, and of every color; dogs of high degree, and dogs of low degree; dogs who looked like "Dignity and Impudence" in that famous picture by Sir Edwin Landseer, which you will all see one day if you have not seen it yet; dogs who were shaggy, and dogs who were smooth; dogs who were very sleepy, and dogs who were very wide-awake; dogs who were so tiny and so sleek that you would long to cuddle them in your arms, and dogs so big and so bear-like that you would be afraid they would hug you to death.

In fact, never before had so many dogs of such different kinds been seen together under one roof.

And what do you think this roof was under which all these dogs were gathered together?

It was a glass roof, and there were glass walls to sup-

From "A Tale of Two Terriers." Copyright, 1905. By H. M. Caldwell & Co., Boston. By permission.

port it, and there were the flags of all the nations of the world, palm-trees, and tropical plants of all kinds growing in tubs, and there were light brown shades to keep out the hot sun, and hundreds and hundreds of well-dressed men and women and boys and girls walking about and enjoying the sight and the pleasant air in this great glass house.

And where do you think this wonderful house of glass could have been?

It was at a place called Sydenham, near London, in England, and the name of this wonderful glass house was "The Crystal Palace."

But how came all these dogs there? you may well ask.

The answer is easy: it was the first Great International Dog Show that was ever held either in England or America, or anywhere else; and there were two very wonderful things about it; the first wonderful thing was, of course, the large number of different kinds of dogs,— dogs from every nation where dogs are found, all happily housed together; and the next wonderful thing was the great crowd of people who went to see them. The Queen of England herself was there, and all the young princes and princesses, and all the great ladies and gentlemen of the land, as well as thousands of ordinary people, many of whom went to see Royalty as much as to see the dogs.

Of course, every one who has a dog, and loves his or her dog, thinks it is the very best dog in the world. But, for the first time, prizes were to be given to the owners of those dogs which were considered to be the best by men to whom the dogs did not belong at all,— independent judges, they were called.

But there was another thing quite as interesting as the dogs, the Royalties, the judges, and the great crowd, — and that was the visits which the owners of the dogs made to their pets every day, and the joy with which their dear dog friends received them. Their barks of delight made a perfect Babel of noise, which even the music of the fine military band or of the great organ, which played at intervals throughout the day, could not drown.

FAMILIARITY BREEDS CONTEMPT

AFTER THE PAINTING BY CARRINGTON

The indifference with which the handsome dog looks on the intruding beetle crawling over his tail, reminds us that:

"The big fleas have little fleas
Upon their backs to bite 'em;
The little fleas have smaller fleas,
And so *ad infinitum.*"

For you must know that, if you send your dog to a dog show in the hope that he will win a prize, he must leave you for all the time the show is open. He must live in a house all by himself. He must have a number put outside of his house, and the visitors can only find out his name and his pedigree and the name of his owner by referring to his number in a catalogue. He must be fed by strangers, for his owner cannot be with him all the time, and so you can understand how joyfully he welcomes the visits of his master or mistress.

So every day and all day long for a whole week were affectionate greetings and joyful barking, and of course the dogs who had won the prizes had the most visitors every day and all day long. These dogs had blue ribbons around their necks, and their names and ages, and the names of their fathers and mothers and grandfathers and grandmothers and their great-grandfathers and great-grandmothers — which is what we call their pedigree — were printed on cards and hung in front of their houses.

Now, one of the dogs was called Duchess, and she was a terrier, and she was the winner of the first prize at this famous dog show. She had a very long and very distinguished pedigree; all her "points," as they say, were perfect, that is, she was just the right height, just the right length, just the right color, her temper and her manners were of the best, and she was the champion dog of the first Great International Dog Show.

The Duchess became the grandmother of one of the heroes of this story. She had a daughter named Vic — Vic belonged to Mr. John — and Vic had a son named Crib.

When he was born, he was a great curiosity. He was such a funny little object that this saved him from being drowned with his brothers and sisters. Mr. John said: "We'll keep this little chap, and see how he'll turn out." So Crib was allowed to live, to Vic's great delight, and she made a very good mother. She gave him plenty of food, washed him often, kept his hair nice and smooth when he was a very little puppy, and, as soon as he was old enough, lost no opportunity of teaching him all that

she knew. Vic was a very good ratter; and, knowing that this is one of the most important qualifications of a terrier, she made a point of training Crib, and he soon learned to smell out and hunt a rat.

One piece of advice which Vic gave to her son, she made a point of repeating day after day, because she found that at first she did not make him do exactly as she wished. This was, "Never give in to another dog, however big he may be."

Now, one day, when Vic had been saying this over and over again to Crib, there came upon the lawn a large black retriever. Crib, wishing to show how brave he was, went up to the stranger and gave him a pinch in the leg, and then made a noise at him, which he called barking, jumping from side to side, and making his voice as loud as ever he could. The big black dog took no notice of this at first, simply wagging his tail in an amiable manner; but, when he felt a second pinch, it was too much for him to endure, so he put down his long black nose and turned little Crib upside down in a minute. When Crib came to himself, and saw the big black dog standing over him, he put down his tail and scampered away to his mother. Vic, of course, was looking on, hoping her son would distinguish himself; but, as soon as she saw him run away, she sent the black dog off like a shot, and then scolded Crib until he felt quite ashamed of himself.

"I never should have thought it of you, Crib, never!" said Vic, looking so very angry. "To run away like a coward after all I have said to you!"

"Oh, mother, I thought that black dog was going to bite me!" said Crib, hanging his head and trembling.

"You would have deserved it if he had bitten you," said Vic, severely. "Why did you bite his leg?"

"Because I wanted him to go away," said Crib.

"I dare say you did," replied his mother; "but you should have remembered that he was doing no harm; and it is folly to rouse the anger of a dog ten times as large as yourself. Little dogs should not be rude to large ones; and young dogs ought not to be impertinent to old ones."

"I was trying to do as you told me," said Crib, gloomily.

"Then you misunderstood what I meant. I said, 'Never give in to a dog,' meaning that, if a dog attacked you, you should fight him as long as you could stand, whether he was large or small. But I don't wish you to be the first to make a quarrel."

"I hope I shall not see that black dog again," said Crib.

"Why?" asked Vic.

"Because he will laugh at me," answered Crib.

"Never mind if he does; you are sure to be laughed at if you do foolish things," said Vic. "When you see him again, don't go rudely up to him; but don't run away on any account."

"Well, I'll try, mother," said Crib; "but it is very hard."

"That may be true," answered Vic, "and young dogs will make mistakes. Your grandmother used to say that if a young dog did a foolish thing twice, he would never grow up to be worth anything. I should be grieved if you did not grow up a brave dog, Crib."

Here the conversation was brought to an end by Mr. John, who took Crib up and put him on his shoulder. Crib knew that he was quite safe, so he sat still until Mr. John put him down again. Then Mr. John brought a ball, and played with Crib, to his great delight. Sometimes he pretended to throw the ball, all the while keeping it in his hand, and Crib would scamper away after nothing. But after a time he learned this trick, and would not be cheated any longer. All the while Vic sat watching, pleased to see her little son enjoy the fun.

"Cats," said Vic to Crib, "are constantly interfering with our comfort. We should be a great deal happier if there were no cats in the world; they are the greatest possible nuisance. I recommend you to have nothing to do with them."

Vic was panting for breath as she made this remark, having just chased an ill-tempered cat called Fluffy all around the stable-yard, and at last made her take refuge

on a high wall, where she sat in safety, growling and glaring savagely. The cause of Vic's quarrel with Fluffy was that she would hide behind the flower-pots in the greenhouse, and sometimes, when Vic went into the greenhouse with Mr. John, while he smoked his pipe after luncheon, Fluffy would spring out from her hiding-place and give Vic a severe scratching before she knew what was coming. This made Vic very angry; she said it was so mean to hide, and take a dog unawares.

So she determined to give Fluffy a lesson; and they had a great fight in the greenhouse, upsetting some flower-pots. Then Fluffy ran away, Vic following. But, as Vic was rather fat, Fluffy had the best of it, getting upon the wall. Then Vic found her son Crib, and immediately began to tell him what very disagreeable animals cats were, advising him to have nothing at all to do with them.

"But, mother," said Crib, "I know a cat that is not disagreeable at all; he is very kind to me, and we have lots of fun together."

"Very well, my dear; I dare say you think you know much better than your mother, but perhaps you will find out one day that cats have claws, and use them." And Vic looked as if she were one of the wisest of dogs, and made herself quite tall.

"Oh, I don't mean to say that all cats are nice!" said Crib; "but I do think Ben is, and he can catch mice even better than you can."

Upon hearing this, Vic gave Crib a tap, and told him not to be impertinent. So Crib said no more on the subject, but trotted away, and, finding a piece of dirty rope, he seized it and galloped around and around the lawn with it until he was tired. Then he saw some birds in a tree, which, when he barked at them, flew to another, and kept him running about and barking for a long time.

Crib, when he was little, had scarcely any nose at all to speak of; what he had was black, and might be called a snub nose. His head was like a little round ball, with long, soft hair, very like sable fur, sticking out all over

it; indeed, when he was lying curled up asleep on Miss Polly's lap, he looked like a little sable muff. Up to this time he had belonged to Mr. John; but Miss Polly, Mr. John's sister, being very anxious to have a dog of her own, begged her brother to give Crib to her, and Mr. John very kindly did so.

At this time Crib used to do all he could to make his mother play with him; but Vic, pretending to be getting old, said "her romping days were over," and preferred a comfortable nap on the lawn in the sunshine, to running about with her son. So Crib would try to console himself by snapping at the flies; and if by chance he caught one, he was much astonished, and nearly choked. At last he would creep away and look for Ben the cat, and then the two would have some fine sport. Ben was a beautiful cat; he was gray, and striped like a tiger. He and Crib were the greatest of friends, in spite of Vic's warning. When they played, they used to scamper after each other, and seize each other around the neck with their soft paws (for Ben never put out his claws to Crib), and roll over and over.

Then Ben would try to catch Crib's tail, which he had just learned to wag, and Crib would make a noise, which he called barking; and then they would roll over together again, enjoying the fun very much, until Vic, having wakened from her sleep, came to see what the noise was all about. She became a little more reconciled after a time to Crib's games with Ben, when she saw no harm came of it, and that it gave her little son so much pleasure; but she never altered her opinion about cats in general, and never would make a friend of one herself.

Sometimes, when Crib wanted him, Ben was busy catching mice in the hay-loft; and then, nothing that Crib could say or do would induce Ben to leave his mouse-hole. He used to say, "Duty first, and pleasure afterward," for Ben was a very wise cat. So Crib was obliged at such times to try and amuse himself. In order to do so, he would look about for a plaything, and would take anything — a rubber shoe belonging to one of the ser-

vants, a strap out of the harness-room, a strawberry basket from the potting-shed; and once he took one of Miss Jenny's lace collars, which was put out on the grass to bleach. He amused himself by tearing the collar into little pieces not larger than a quarter, which he spread all about the lawn, so that, when Vic came and saw what had happened, she told Crib he would get a whipping. Miss Jenny was very angry, and threatened all sorts of punishments; but Miss Polly told her she ought not to have left the collar within reach of so young a puppy. Crib was under the sofa trembling, while this conversation was going on; and he only dared to come out when he heard Miss Jenny say she would forgive him, as this was the first time he had done such a wicked thing.

But Miss Jenny could not let the occasion pass without trying to make Crib understand that he must not tear any more lace collars. So she made him follow her into the garden, and, when they reached the place where the shreds of her collar were lying scattered about, Miss Jenny knelt down on the grass and pointed them out to Crib. Crib's ears and tail were drooping in the most abject fashion, because he saw by the expression of Miss Jenny's face, and heard by the tone of her voice, how annoyed she was. He tried to look in another direction, but Miss Jenny would make him turn his head toward the bits of lace.

"Oh, Crib! you naughty, tiresome, little mischief!" she cried; "look what you have done! Will you promise never, never to do so any more?"

Then Crib, hearing Miss Jenny's voice, soften, crawled up her dress as she knelt, and licked her hands, and tried to put his little nose up to her face; and his eyes looked so sorry that Miss Jenny kissed the top of his soft little head, and told him to "run away and be a good doggie for evermore." So Crib ran away as fast as he could to his mother, who told him he might consider himself a lucky dog to be let off so easily.

Gertrude Sellon's books though originally written in English have always had great popularity with American children. She wrote during the middle of the Nineteenth Century.

A DONKEY IN A POLICE COURT.

BY

GERTRUDE SELLON.

A TRUE STORY.

MY master had had a more than usually successful morning's round; my load was disposed of, and we were returning leisurely down Regent street, when he was suddenly accosted by a man who was walking on the pavement. Being in a particularly good humor, my master returned the greeting cordially enough, and the two friends soon agreed to go together to some saloon near, to take a glass to keep out the cold, and to drink to their mutual prosperity.

"Here, you see to the donkey, Tom," said my master to a boy who generally went his rounds with him; "and do not you let nobody touch him nor the cart till I come back again. Do you hear, Tom?"

"Yes, I hear," was the somewhat sulky reply; and, drawing me up close to the curbstone, where I should be as much as possible out of the way, my master, saying he should not be gone long, turned up a narrow street with his companion, and was soon out of sight.

Tired with my morning's round, and having had but a scanty breakfast, I was glad enough of the rest, and was just composing myself to a quiet sleep, when I suddenly heard a voice, which made every limb in my body tremble with joy, exclaim, eagerly:

"Why, Neddy, Neddy! dear Neddy! Do you remember me?"

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Remember her! my own dear, dear mistress! Could I ever forget her? Half-wild with delight, I forgot where I was, and, dragging the cart after me on to the pavement, I began a series of ecstatic brays, rubbing my nose at the same time against the kind hand that was held out to me, and endeavouring to show, by every means in my power, my unbounded joy at again beholding my beloved mistress.

"Oh, look, papa, papa!" exclaimed my mistress. "Neddy knows me! Neddy remembers me! Good Neddy! Dear old Neddy!"

In her delight at seeing me, my mistress had, like myself, forgotten that Regent street, in the middle of the day, is rather a public place in which to give way to outbursts of affection. Already a crowd had gathered around us, some wondering, some laughing, some standing by in silent curiosity to see what would be the end of this strange greeting; cabmen drawing up to enjoy the fun; omnibus drivers and conductors lingering on their way, and looking back to see what all the confusion was about; every moment the mob increased, swelled, as it was sure to be, by the crowd of dirty boys and idle loungers that in London springs up at a moment's notice, no one knows how, no one knows from where.

"Annie, my dear Annie, this is no place for you!" exclaimed a voice that I did not recognize; and, looking up, I saw a fine, tall, handsome-looking man, who drew my mistress's hand away from me, and placed it on his own arm.

"Papa, dear, will you see about Neddy?" said my mistress, looking around, evidently frightened and bewildered by the confusion around her, and endeavouring to make her way through the crowd of bystanders.

But having so lately discovered her, I was in no humour to let her go; and utterly disregarding every impediment in my way, I pushed on, braying loudly as I went. Peals of laughter greeted my attempt.

"Make way for the lady! make way for the donkey!" "Hurrah, Neddy, hurrah!" "Do it again, Neddy! do it

again!" shouted the boys; while, encouraged by their cheers, I pushed and pushed more strenuously than before.

Louder and louder rose the peals of laughter; higher and higher swelled the cheers; and, thinking I was doing the most appropriate thing possible I redoubled my efforts to keep up with my mistress, when, just at this moment, who should come down the street but my late master!

"Halloo!" he exclaimed, with a coarse oath; "what is all this row about? Who is interfering with my property?" and he put out his hand to seize me fiercely by the rein.

"Stay! stay!" said Mr. Morton, in a voice so calm and firm that I felt the hand upon my bridle tremble. "I rather think it is you, my man, who have been interfering with my property. Here," added Mr. Morton, turning to two or three of the police, who had by this time made their way to the spot, and were actively employed in keeping back the crowd, "I want your assistance, for I have reason to believe that this donkey, which belongs to my daughter, was stolen from me three years ago by this man. I give him into custody on this charge, and require that you meantime should take the donkey into safe keeping."

It would be impossible to describe the man's rage as he listened to these words. He swore, he stamped, he abused Mr. Morton in every angry epithet he could think of; and yet all the time he trembled, and did not once dare to look his accuser in the face. Directing the policemen to bring their prisoner to a police station, where he could substantiate his charge, Mr. Morton jumped into a cab, and was driven quickly from the spot, leaving me in the hands of the policemen, and bewildered by the rapidity of events which, long as they have taken to tell, passed in the space of a few minutes.

My first feeling at finding that my dear mistress had again departed was one of unmitigated terror, and I looked around in trembling dread that now, being once

more at the mercy of my brutal master, I should be made to suffer some horrible punishment for having thus given way to my delight at seeing my long-lost friend. But I soon found that, for the present, at any rate, I had nothing to dread. Struggle as he would, my master was in stronger hands than his own. He might curse and swear at me, but he had no power to do more, as, led along gently by a tall, grave, powerful-looking man, and followed by a crowd of noisy, hooting, cheering boys, I slowly made my way down street after street, until, finally, I was stopped before the door of one of the largest police stations of the metropolis. Here my master disappeared, while I remained standing in the street, under the charge of my grave-looking conductor, and surrounded by a continually increasing crowd, to whom I was evidently an object of the greatest amusement and curiosity.

Some time had passed in this manner, when the policeman who led me was joined by one of his companions, who, having said some words very quickly to him, of which I only caught "donkey and cart," there was a renewed bustle and stir around me, and then the traces that fastened me to the cart were unhooked, and I was led through the crowd, now cheering louder than before, toward a doorway, so blocked up by people that I felt quite frightened, and refused to go on.

"Come, Neddy, come along," said the policeman who had held me hitherto. "There is no one who will hurt you here; you need not be afraid." And at the same time he desired his companion to go on, and make a way through the crowd.

Encouraged by the kind voice in which he spoke, and by seeing that the people fell back right and left at the orders of his companion, I plucked up my courage, and stepped through the door into a passage, broad and paved with stones like those on which people walk in the streets of London. I had never been in such an odd place before, and I did not half like it, and was more than once inclined to turn back; but the man kept a firm but gentle

hold of me, leading me on, till at last two great doors were thrown open, and I found myself in a large room filled with people, sitting on benches raised one above another. I was quite bewildered at the sight of so many heads, — more especially as at my first coming in there was a general buzz of voices, and all eyes were evidently fixed on myself.

A loud cry of "Silence! silence!" gave me a moment to recover myself, and then I heard a grave voice say:

"Let the donkey judge for himself. You are at liberty to call him," added the gentleman, turning to my late master, whom I now for the first time perceived standing in an open space in the centre of the room.

"Here, Neddy — Neddy — come here, Neddy. There is a good donkey, come here," said the man in a voice of the most insinuating gentleness; but as I had never heard him speak so before, no wonder I did not recognize its tones, and the only answer I made was to hang down my ears and plant my tail very firmly between my legs.

There was a general burst of laughter that not the presence of that grave-looking gentleman, nor the reiterated cries of "Silence! silence in the court, there!" could in any measure suppress; while a voice exclaimed: "He has had the donkey, that is clear enough, for the poor brute thinks he is going to beat him now. Hush! hush! See what he is going to do next. Here comes the lady. Silence! Hush! hush!"

"Now, madam, it is your turn," I heard the grave-looking gentleman say; and in another moment I saw my dear mistress rise up from a seat by his side, and, leaning on the arm of her father, come down into the open court.

"Neddy! dear Neddy!" she said, just in the way that she used to call me up to the fence years ago. I forgot all my past misery, and, thinking only of my joy at seeing her, I set up such a bray as I had never brayed in all my life before! Oh, how the people shouted with laughter! The very judge could not resist the infection of their merriment, and gave way in spite of himself.

Why, what had I done that was so ridiculous? I could

only express my joy with the voice which nature had given me. If it was not so sweet and gentle as some of theirs, that was not my fault. At any other moment my self-love might have been seriously wounded; but now I could only think of my delight, and, breaking away from the policemen who held me, I went right up to my mistress, and, rubbing my nose against her hand, I whinnied out my happiness, entreating her as best I could to let me stay with her now and for ever.

There was no laughter in the court then; and I have heard my mistress say since that there were tears in many an eye. Real, genuine affection is somewhat rare in this world, and, when it is found, it goes straight to the heart even of the most hardened; and there are few so bad that they will make fun of the evidence of pure, unselfish love.

There was a minute's pause, and then I heard the grave man say, in tones of such kindness as showed his interest in my fate:

"I am quite satisfied, madam. No witnesses that could be produced could speak half so strongly to the truth of your case as does the affectionate remembrance of the poor dumb beast. That the donkey is the one that was stolen from you three years ago, there can be no doubt. All that remains to be proved is, who did the deed; and that, I am afraid, with all his sagacity, the animal will not be able to tell us. I shall send the case to trial; and in the meanwhile," turning to Mr. Morton, "it is for you to produce the evidence that the man now charged with the theft was the person who stole the donkey."

"I have no doubt whatever that I shall be able to do so," replied Mr. Morton.

"You can remove the donkey out of court," said the grave gentleman, and then he turned to my late master, who was standing dogged and silent, in charge of two of the police, and proceeded to address him in terms which I did not understand, my whole attention being now fixed upon myself, and upon the thought of being separated

from my dear mistress, whom I had vainly hoped I was never to leave again. In my anxiety to remain by her side, I quite forgot that I was in a court of justice, and that, as a well-bred donkey, it was my duty to submit myself to the laws of my land, and I struggled hard to pull away from the policeman's hold, and to follow my mistress, who was now led back by her father to the seat from which she had risen.

I do not know how the struggle might have ended; but, seeing that my endeavours to get free were disturbing the whole court, my mistress once more came up to me, and, patting me gently on the forehead: "Oh, Neddy," she said, "this is very naughty of you! Come with me." How could I disobey?

"You may leave him," she said to my conductor; "he will go away with me directly."

Go away with her! Of course I would, to the world's end. My first journey, however, was destined to be a much shorter one; for, no sooner had I quietly walked by her side through the court-house into the passage than, placing my rein in the hand of the policeman:

"He will follow you now, I think," she said. "Go, Neddy; there is a good Neddy. I will come to see you very soon. Good-bye, Neddy!" and, patting me kindly, before I had time to look around, she was gone.

A crowd, little less than that which had accompanied me to the court, was awaiting my return, and eager inquiries greeted my conductor as to the result of the trial. Every one talked so fast and so loud that I could not make out much of what was said; but I gathered sufficient to make me very happy in the feeling I should soon be restored to my pleasant home, and that meanwhile I was to be left in the care of my present guardian, whose kindness toward me had already impressed me greatly in his favour.

I gleaned, too, from what I heard, that the result of the trial depended mainly on the evidence of some man who was supposed to have seen me soon after I was stolen from my dear mistress.

I was one day musing, in a discontented state of mind, when I heard the door of the stable open. Thinking, however, it was only one of the men come to attend to their work, I did not even trouble myself to turn my head, until suddenly I felt a hand laid on my shoulder, and heard a voice I thought I remembered say, sadly enough:

"Why, Neddy! who would have thought that you and I should have met again in such a place as this; and you so altered? Poor old Neddy! how badly you have been used!"

Old Neddy, indeed! My heart swelled with such mortified vanity at the name that for the moment — ungrateful that I was! — I felt more vexation than pleasure as I recognized Thomas standing by my side. But it was only a momentary feeling, and, looking up in his face, I endeavoured to show my pleasure at seeing any one connected with old times.

"Ah, Neddy!" continued Thomas, "so you know me, do you? It is more than I should have done by you. You do look dreadfully bad. I shall never get that rough, shaggy coat of yours right again. No, not though I groom you for hours at a time."

Thomas groom me again! I never thought of the rudeness of the speech in my exceeding joy at hearing I was to be again in his care. Ah! then I must be free from my detested master. I must be going back to the home and the mistress I loved so well.

"So it is all over, is it?" inquired a policeman, who at that moment entered the stable and proceeded to unfasten my bridle.

"Yes; it was decided some hours ago," said Thomas. "It was a queer trial, was it not?"

"The queerest I have ever heard," returned the policeman; "and that is saying a good deal, for strange stories come to our ears. If it had not been for this donkey here, ten to one your master would never have gained his cause. The man told a wonderful plausible tale. But this dumb beast here told a better. You should have

been in court that day. It was a sight to remember, and there was many a one who thought it no shame to be seen with tears in their eyes; and as to Mr. Wickharde, I never seed him so moved in all my life. That donkey is a first-rate witness. For my part, I would rather have him than half the men I know."

This testimony in my favor seemed to raise me in the estimation of Thomas, for he patted me far more kindly than before, saying: "Poor old Neddy! He will be glad enough to be amongst his old friends again."

"How did the trial go?" asked the policeman. "I wanted to hear the end; but I was on duty here this morning, and could not manage it. I almost thought they would have sent for the donkey, and I meant to have taken him down myself."

"It did not last long," returned Thomas; "there was no question about the donkey being Mr. Morton's property. The only point was whether Jackson stole him or not; fortunately, he had been met by one of master's own workmen the morning after the theft. Jackson was riding the donkey at that moment, and Mills felt sure he recognized it by the star on its forehead. It is a very peculiar mark, you see," continued Thomas, as he turned my head to the light, and pushed back some shaggy hairs. "Jackson had never thought of concealing it; and it was rare and lucky for Neddy he did forget. . . .

The idea of freedom was still so new to me that I could hardly realize the fact that I was safe from the brutal treatment of the man whom, for the last three years, I had been forced to call my master; and, as Thomas led me out of my place of confinement, and I found myself once more in the streets of London, I turned and looked about me in nervous dread, fearing that I should suddenly hear the sound of Jackson's hated voice, and feel myself in the grasp of his powerful hand.

"So, whoa, Neddy! gently, my man!" exclaimed Thomas, in the reassuring voice of old times. "No need to be afraid now; there is nobody coming to hurt you. Come on, old fellow, come on. Come, make haste, and

do not put your tail between your legs in that miserable way. I ain't a-going to flog you, Neddy. Why, you are making a sight of yourself and me, too!"

True enough. I felt I looked a pitiful, craven-spirited wretch; but I had been so long accustomed to find that a word and a blow went together that it had become a sort of habit of nature to endeavor to protect myself from the assault, and I could have no more helped cowering down and holding my tail tight between my legs than I could have prevented myself from blinking if I had been forced to look suddenly at the sun.

However, seeing that Thomas was vexed at my miserable appearance, and not wishing to mortify the kind-hearted old man, I endeavored to pluck up courage, and to trot along by his side with somewhat of the air and spirit of bygone days; and, as I found that we passed street after street, and square after square, without stop or molestation, I began gradually to acquire confidence, and to believe in the reality of my deliverance. After going a considerable distance, we at length arrived at the entrance to one of the great railway stations.

"Now, my man," said Thomas, as he pulled me up for a moment, and gave me an encouraging pat, "do not you go for to make a fool of me and yourself; you are going to see queer sights and hear queer sounds, so make up your mind to behave like a sensible beast, as you are. There, do you hear that? that is one of them," added Thomas, as a shriek was suddenly heard close by our side, followed by screeches, a little less discordant, ending in a series of agitated puffs, as if some mighty monster was giving up the ghost.

"Do you hear that, eh, Neddy?" repeated Thomas, as he turned my head in the direction of the noise, as if to accustom me to the sound.

Hear it? Of course I did; but what did I care for it? Had I not been accustomed to almost every railway in the kingdom? and did not I know the sound of a locomotive, bursting for very spite at being stopped in its mad career?

I always envied them their strength and powers of en-

durance. I afraid of them? I should think no, indeed; and, quite proud to have an opportunity of reinstating myself in Thomas's good opinion, I held up my head, and, shaking my ears with an air of supreme indifference, I walked with dignified unconcern right into the shed where the engine was showering out a perfect cloud of white breath.

"Well done, Neddy! good donkey!" said Thomas, patting me approvingly; and then he proceeded to lead me up the platform to where a great square box was standing with its doors wide open. Into this dark, uncomfortable-looking cage he bade me enter; and now I confess a feeling of terror came over me, putting all my boasted courage at once to flight, and, turning around, I struggled hard to escape from Thomas's hold.

"Whoo, hoo — gently, stoopid! What is the matter?" said Thomas, crossly. "Why, what are you afraid of now? Who is going to hurt you, Neddy?"

Ah, indeed, who? "How am I to tell," thought I, "shut up all alone in that dark prison? Who is to say whether I shall ever make my escape alive, or, if I am so fortunate, whether it may not be only to fall into the hands of my tormentor; or, worse still, who can say that he is not hidden in some dark corner of the box?"

"Why, Neddy, one would think that you expected to find your late master there," added Thomas, in a milder tone.

"And so I do," thought I; but how was I to tell him so?

"You need not be afraid, old donkey," continued Thomas; "he is far enough away now. He cannot get to you. Come, Neddy, come along; you will be quite safe and comfortable in there, and I will give you some grain to eat, and you may amuse yourself with it during your ride. Come, Neddy, come along."

It was impossible to misdoubt the kind tones of Thomas's voice.

"If he meant any treachery against me, he would never speak like that," thought I. "Besides, have not I always found him a true, good friend? and is it not very

wrong not to trust him now? " and I turned around and looked into the box. It did not look pleasant, certainly; but, after all, I had lived in worse places; and so, summoning up my resolution, I put one step on the sloping board that led up to the cell. Dear me! how hollow my footfall sounded! I did not like it at all, and was about to draw back again; but Thomas was by my side, and for very shame I did not dare act the part of a faithless coward; so I took another step, and then another. Still that hollow, hollow sound. But it was over now, and I stood inside the box, and looked around, half in terror, half in surprise. It was not so very bad, after all.

There were nice, soft-looking sides to the stall, and plenty of clean straw to lie upon; and Thomas remembered his promise, and put some food in the manger, and then, tying me up quite tight, he bade me good-bye. The doors were shut, and I was left alone in the darkness. Soon came a whistle, a shriek, and then a tremulous motion. Oh, how my heart sank within me! But there was no escape. I had but to submit, and bide my fate. Then my prison swang from side to side, and rush — rush — rush — roar — ro-r-r — ro-r-r-r — where were we going? I knew nothing — remembered nothing — till suddenly a vibration, a stop. Whirr — whirr — whirr — fainter grew the sound till now all again was silence. My box swings around — I feel quite sick with fright, when open fly the doors, and there stands Thomas, looking so kind and pleasant. I had never loved his face so well before.

" Well, Neddy," he said, as he undid my halter, " it is all over. We shall soon be at home again. Ay, do you remember the old place? " he added, as, leading me out of my prison, I stood still, sniffing in with delight the pure fresh air of heaven.

Remember it? I should think so. I knew every inch of the ground as we drew toward home; and, forgetting all my troubles and sorrows, I kicked and jumped about as if I was once again the frolicsome donkey of years gone by. Even gruff old Thomas seemed moved by this evidence of my delight; and, throwing off his usual dry, hard manner, he spoke to me so kindly that my heart

leaped again and again with joy. But when at length the gates of my own dear, dear home came in sight, I could no longer contain myself, and trotted on as fast as my legs could carry me, Thomas letting go the rein, saying, with a smile: "You know your way now, old fellow, I guess, and will not run away again, I fancy."

Open went the gates, and then the avenue was before me, straight now up to the doorsteps; and there was my mistress, her father, and the strange gentleman. Oh, how I kicked up my heels with joy, and then galloped up the drive as I never thought my old legs could have galloped more!

You should have heard my mistress's merry laugh. It was the pleasantest sound my ears had listened to for many a long day past; and you should have seen how she patted and caressed me, and called me her "dear old Neddy — her good, faithful donkey;" adding: "We will never part again — no, never. Will we, Neddy?"

I could only rub my nose against her soft white hand, and whinny out my joy and gratitude. My heart was too full; I almost thought it must have burst from my excess of happiness. And then, when she led me — she, my own dear mistress herself — to the field where I had spent all the first happy years of my existence, who may describe the emotions which overpowered me? First, I galloped around and around the field; then I threw myself down on the soft green grass, and rolled, and rolled, and rolled myself again and again in my ecstacy. Then, at last, rising up, and looking around me, I seemed as if I could never tire of gazing at all the well-remembered spots. Every twig in the hedges seemed like some old familiar friend; and as the birds sang out their merry songs from the boughs of the trees which had so often sheltered me, it sounded to me as if they, too, were carolling forth my welcome home.

Home! Ah! those who have never lost it can never fully appreciate its value; and, as I lay down to rest that night, it was with feelings of such overflowing gratitude as I know not how to express.

A DOG ON HIS TRAVELS.

ANONYMOUS.

ONCE decided, it was evident that the sooner I set off the better; because the road not being familiar to me, it was important that I should travel it again before all traces of our former journey were lost. As yet, we had not been so long in London that I had reason to think I should recognise the principal turnings, besides various objects on the road. I had been asleep during part of the journey, it is true; but I hoped that my sense of smell would come to my help when eyesight failed.

And here I reflected upon the many advantages I had over my master in travelling. First, what a much better nose mine was! His seemed of very little use to him up in the air, out of reach of the ground.

If he had not been able to ask his way, I am sure he could never have found it out by smelling. Then, how inconvenient to be obliged to carry so many things with him! He could not move without a portmanteau or a suit-case full of clothes, instead of being contented with one good coat on his back. I never could understand why anybody should want more than one coat. Mine was always new, always comfortable, suited to all seasons, and fitting beautifully, having adapted itself to my growth at all stages of my life, without any attention from me. *I* never had any trouble with tailors, snipping and measuring; trying on and altering. My coat would dry on me, too; whereas my poor master could not even jump into the river without taking his off. If it rained, he wanted an umbrella. Then, he never seemed able to run any

From "Cat and Dog," published by Griffith Farran, Okeden and Welsh, London.

distance. For a few hundred yards it was all very well, but after that he began to walk; and if he made a single day's journey, he was obliged to be helped by a horse. Poor man! I pitied him; and yet I never for a moment hesitated to acknowledge him as my master, for, with all his defects, I felt that he was in possession of some faculty incomprehensible to me, but which overpowered a thousand times my animal superiority.

But to return to my own adventures. I determined to find my way to my native village as a dog best might, without delay. So the next morning I set off, following my nose, which was my best guide, through the intricacies of the London streets. More than once I took a wrong turn; but after going a little way up the street I always discovered my mistake, and retraced my steps.

Once I met two gentlemen whom I knew. One asked the other if I was not my master's dog; the other looked round and called, 'Captain! Captain!' I came very near wagging my tail and looking up at the familiar sound, but I fortunately recollected myself in time. As he was not my master, I was not bound to be obedient; so by a strong determination I kept my ears and tail still, and trotted on, taking no notice.

Another time, as I was sniffing the ground where several streets branched off, I heard a voice say, 'There's a dog that has lost his master.'

'Fine dog, too,' said another; 'there will be a good reward advertised for him.'

'Humph, there's more to be made by him than that,' replied the first; and as I looked up at him, I recognised the very man whom I had formerly prevented from breaking into my master's country house. I growled fiercely; and if he had attempted to approach me, I was prepared for a spring at his throat.

'He seems to have a spite against you; better leave him alone,' said the other. And the two turned away, evidently aware that it would not be safe to meddle with me; and I once more pursued my journey unmolested.

Having my own reasons for not wishing to attract at-

tention, I jostled against as few passengers as possible, and did my utmost to keep clear of inquisitive dogs or arrogant horses, so that I met with few obstacles, and before mid-day arrived safely at the outskirts of London. Then my way became much plainer; a country road, with hedges and fields on each side, was easily tracked; and I could hold up my head in comfort as I ran along at a good pace, instead of keeping my nose close to the ground for fear of losing my way.

I came to a place where four roads met, and there I was perplexed, though but for a few moments. There was a sign-post, but that was nothing to me; it might have been useful to my poor master, but to me it was only one of his many encumbrances, which were superseded by my nose.

So I followed my nose up one of the roads; it would not do. Up a second and a third; still my nose refused assent. As there was but one road besides I had no further choice; so I troubled my nose no more, but galloped joyfully ahead without any difficulty, wondering whether my master would have found the way by his reason as surely as I had done by my instinct.

As the day went on, I began to grow uncommonly hungry; that is to say, hungry for *me,* who had never yet known what it was to want a meal. Accustomed to regular daily food as often as I required it, I do not suppose that in my comfortable life I ever knew what real hunger was, — such hunger as is felt by poor creatures with but scanty food for one day, and uncertain even of *that* for the next. But I felt that I should like to have my dinner, and, for the first time in my life, was called upon to find it for myself.

And really, when one has been accustomed to have set before him every day, at his own hour, on his own platter, a supply of bread and meat nicely mixed, with perhaps some pudding to finish with, and no trouble required on his part but to eat it tidily, and say, ' Thank you ' after his fashion, it is no small puzzle suddenly to be obliged to provide one's own dinner from beginning to end — catch-

A FAMOUS DOG

The dog has always been known as the friend of man. One of the most famous of man's canine friends is the mastiff of Great St. Bernard's in Switzerland, who in the early part of the Nineteenth Century saved the lives of over forty human beings. His most remarkable achievement was rescuing a little boy whose mother had been destroyed by an avalanche. The dog carried the boy on his back to his own home. There are many famous dogs in myth, legend and fiction, as well as in fact. The name of Trag so often given to dogs, comes from an old root-word which expresses the idea of running and fetching; compare the German word "tragen"—to fetch, to carry.

ing, cooking, and serving it up. There are more in the world than I who would know how to do nothing but eat it. If I had been a wild dog, used to the habits of savage life, I might have hunted down some smaller animal as wild as myself, torn it to pieces, and devoured it raw; but I was a civilised dog, so altered by education, that in my hunting days I always brought the game to my master instead of eating it myself; and here, on the highroad, there was not even game to be caught. I was quite at a loss what to do.

In the course of time I came up with a traveller sitting under a hedge, eating bread and cheese. I would not have accepted bread and cheese at home if it had been offered me, but now I stopped in front of the man, and began to beg for some, licking my lips, and wagging my tail in my most insinuating manner.

He threw me a scrap of coarse bread, saying, 'There's for you; but I daresay you are too well fed to eat it.'

His supposition would have been true enough the day before; but hunger cures daintiness, and now I was glad of such a mouthful. I bolted it in an instant, and looked for more. He threw me one other crust, saying that was all he could spare, and, finishing the rest himself, went on his way, leaving me as hungry as ever.

By and by, in passing through a village, I came to a butcher's shop. The butcher was not in sight, and meat was spread in the most tempting manner on the board.

'How easily,' thought I, 'could I steal that nice raw chop, and run away with it! Nobody could see me, and I do not believe anybody could catch me.'

Steal it — the thought startled me. Brought up from my earliest puppyhood in the strictest principles of honesty — able, as I imagined, to see the best-stocked larder, or the most amply supplied table, without even wishing to touch what was not my own, was I now, on the very first temptation, the first time in my life that I had ever been really hungry, to forget all I had been taught, and to become a thief? Was it only the fear of blows that had kept me honest? Was my honesty worthy the name, if

I was honest only when I had no temptation to be otherwise? I was ashamed of myself, and, turning from the shop, passed on with drooping ears.

Presently I met a dog so fat as to show plainly that he had never gone without his dinner, and yet he was growling over a bone as if he were starving. Looking more closely at him, I perceived that he was in possession of two bones, either of them enough for one dog; but he was unable to make use of one, for fear of the other's being taken from him. So there he lay, with his paws upon both, growling instead of enjoying himself. He was a larger dog than I, but not nearly so strong, being helpless and unwieldy through long habits of greediness and laziness. I saw that I could easily master him, and take one of his bones by force, and at first I felt inclined to help myself by this means. I thought I had a good right so to do. I actually wanted the necessaries of life, while he was revelling in superfluous luxury. Was I not justified, nay, more, was I not bound in common sense and justice to take from him what he did not want, and give it to myself who did want it? Even if I robbed him of one of his bones, I should leave him as much as I took away.

Robbed — another awkward word! I paused again. Assault and robbery were perhaps not so mean as sneaking theft, but were they more allowable? The bones were his own property, given to him by some one who had a right to dispose of them; and though at this moment I might wish for a more equal distribution, I had sense enough to know that it would be a bad state of things if every dog were to seize upon every other dog's bones at his own discretion. It might suit me at this moment, but to-morrow a stronger dog might think that *I* had too much, and insist upon my relinquishing half of *my* dinner. Who was to be the judge? Every dog would differ in opinion as to how much was his own fair share, and how much might be left to his neighbour. No large dog would allow another to dine while he himself was hungry; and it would end by the strongest getting all the bones, while the poor, inferior dogs were worse off

than ever. So I determined to respect the rights of property, for the sake of small dogs as well as for my own.

After all, starvation was not inevitable. It might be possible to get a dinner without fighting for it. I sat down opposite my new acquaintance, and entered into civil conversation with him. I found him much more friendly than I expected. He had certainly been accustomed to more indulgence and idleness than was good for him, but his natural disposition was not entirely spoiled. He was the peculiar pet of a lady, who thought it kindness to give him food that disagreed with him, to provide him with no occupation, and to deprive him of healthy exercise, so that no wonder he had grown lazy and selfish; but his native spirit was not entirely extinguished, and he assured me that a bare bone to growl over, and a little comfortable rain and mud to disport himself in like a dog, were still the greatest treats that could be offered to him. His temper had been further soured by the spite and envy of dogs around him, who, less petted themselves, and not aware how little his petting contributed to his comfort, grudged him everything that he possessed, and lost no opportunity of snapping and snarling at him.

While I reflected on the difference between his circumstances and my own, I felt more inclined to pity than to blame him; but though I condoled with him, I took care to give him the best advice in my power, and to suggest such changes in his own conduct as might tend to better his lot.

He listened with patience and showed his gratitude by treating me with the most cordial hospitality. He gave me an excellent bone, and offered to share his kennel with me; but after my dinner and a nap I was so thoroughly refreshed, that I preferred continuing my journey. He pressed me to call on him on my way back, and we parted excellent friends.

I met with no more adventures or difficulties. Even my night's lodging gave me no trouble, for when it was

growing dark, and I felt too tired to run any farther, I espied a heap of straw thrown out by the stable-door of a roadside inn, and I soon scratched and smoothed it into as comfortable a bed as dog need wish. By break of day I was on my travels again; and being now near my native village, on a road of which I knew every step, I had no further perplexity, and by breakfast-time arrived at my old home.

A MONKEY'S HOME.

BY

MOLLIE LEE CLIFFORD.

I WAS a very happy little fellow when I lived with my mother in the wilds of South America. I used to find no end of amusement playing with my little neighbor monkeys among the branches of the trees, or swinging on the vines that grew in luxurious abundance in our forest home. It was great fun to watch the wild animals prowling through the underbrush, knowing that they could not catch us, no matter how they might try. We were especially fond of tormenting the jaguars, or American tigers, for they are our sworn enemies.

I used to enjoy the nuts, berries, and fruit that grew in our forest home. It was so nice to be able to gather our own fruit, and to have it perfectly fresh whenever we wanted it.

There were hundreds of little monkeys like myself, and all as full of life as it is natural for young monkeys to be. But I was going to tell you my own story instead of that of the other monkeys.

I loved my mother dearly; no human child ever loved their mother more. She was always anxious about me

From "Yoppy: the autobiography of a Monkey." Copyright, 1905, By H. M. Caldwell & Co., Boston. By permission.

whenever I was out of her sight, and used to box my ears very often, but I dare say that I deserved it.

Mother often warned me against being too venturesome, particularly against meddling with any kind of a trap, and, above all things, she warned me to skip into the thickest branches of the tree whenever I saw a man with a gun.

I remember seeing a mother monkey shot; that was the way the wicked hunter secured the baby monkey, which the mother held in her arms. This seemed to be a favourite way for hunters to catch baby monkeys, for a mother monkey would never part with her baby so long as she had strength enough to hold it. Sometimes the baby was shot, too, which was doubly sad.

The cruel shooting affair made my mother more sad and anxious about me. It made me serious, too, for fully half an hour; then I forgot all about it and was as full of pranks as ever. It is not in the nature of a monkey to grieve over the troubles of others; at least, for only a short time.

After witnessing the killing of that mother monkey, and the capture of her little son, my mother repeated her warnings all over again, and for the time being I was greatly impressed.

We monkeys are peculiar animals, as you would readily believe if you were the owner of one of us. We are always glad that we are living, and nothing but cruel treatment can sadden our hearts for any length of time. So, as I have said, I forgot all about the tragedy, and began to cut up capers, as was my usual habit.

The morning following the shooting affair, I was in the highest spirits. I began the day by pinching my mother's nose and biting her tail, whereupon she boxed my ears, and I yelled. My crying was of short duration, however; my spirits bubbled over, and I was up and at it once more.

I was old enough to pick up my own breakfast; instinct teaches us what is good to eat and what is not, and early that particular morning I scrambled down from my bed of leaves among the thick foliage of the tree where my

mother and I always slept. I very soon found a breakfast which suited me exactly. I ate it, then sat on one of the lower branches, thinking what I should do next, when I heard the crackling of twigs in the underbrush.

I leaned over the branch and saw a huge jaguar prowling about beneath me. I knew perfectly well that he was looking for his breakfast, and would have greatly relished a tender little fellow like me, but I had no idea of letting him eat me, yet I could not resist having a little fun with him.

I kept very quiet. I did not wish him to discover me, at least not at that moment. I waited until the beast was directly under the branch where I was sitting; he had not seen me. Slowly he made his way through the underbrush, sniffing the air occasionally, when suddenly I swung myself down, being careful to take a firm hold with my tail, then I pulled the jaguar's ear, and was back on my branch in a twinkling, while the animal uttered a howl of rage. To think a nice little monkey had been so near him, and he must still hunt for his breakfast!

My mother, who had seen my performance, called me to her, and gave me such a lecture as I had never heard before. I was impressed again for about five minutes, and then scrambled down the tree-trunk. As if I would allow any one of those beasts to eat me! What could mother be thinking of!

Delighted with my morning's prank, I left my mother crying and scolding in the tree-top, while I danced about on the stout branches as I made my descent, regardless of mother's crying, scolding, or her warnings of any kind.

Dear, dear mother! how little I thought when I left her in our tree-top home that morning, how very little I thought that I would never come back to her again.

I made faces at her as I scrambled down the tree; I boxed the ears of a little playmate as I passed him; I pulled my grandfather's tail, and nearly upset him as he sat munching his breakfast. In my scurry to get away, I came very near sprawling headlong the remainder of the

way, and, to my horror, the jaguar whose ear I had pulled was crouching beneath the tree.

I came within an ace of being eaten alive. As I came sprawling down the tree-trunk, the jaguar opened his mouth and stood ready to receive me, but just then I struck one of the lower branches, which I grasped, while I regained my footing, and I decided at once that I had business in some other part of the tree. So, instead of being eaten alive, I made grimaces at my would-be devourer, and ran up the tree laughing and chattering, while I congratulated myself on my miraculous escape.

Away I went from one tree to another, chattering gleefully as I pulled down birds' nests, rummaging in holes in the tree-trunks, and having a delightful time as I went on my way. Once, I must have poked my fingers too far in a tree hole, for something bit me. After that I was glad to keep my fingers and my nose out of such places, and decided to amuse myself by eating fruit and berries instead of meddling with what did not belong to me.

When I had been rambling about for some time, I came to a clearing in the woods, the existence of which I had never known before. It was hot there, the sun poured down with a vengeance, but I was determined to explore this clearing, and see all there was to see.

Presently I came upon a queer-looking box. I had never seen anything like it, so I began to examine it. One of a monkey's strongest characteristics is his curiosity.

On making my examination, I found some pieces of cocoanut, and in one corner there was a pile of sugar. I did not know at the time what it was, but have learned since, as I have learned everything else, by keeping my eyes and ears open.

Without dreaming of danger, I crawled into that box, and picked up a piece of the cocoanut. It is not often that we monkeys find our cocoanuts broken for us, so I was greatly pleased at what I found. I tasted the sugar and found that it was good, then I sat down to enjoy myself.

The box was not very large, but it was cool, and I be-

gan licking the sugar from the floor. Suddenly my head struck against something that dangled from the top of the box. I heard a click, the door shut with a snap, and I was a prisoner.

I remembered my mother's warning when it was too late. I tried my best to open the trap, but it held me firmly. I cried and screamed at the top of my lungs, but I was too far away from my tree-top home for my mother to hear me. Then a hunter came and took me away, far, far away from my native home, and I thought my heart would surely break.

"COLLIE" OF THE FOG-BELL.

BY

OLIVE HURD BRAGDON.

ONE day, after some deliberation, I was taken into the dory. I must confess it was dreadfully rough when we left the mouth of the breakwater for the open bay. Our dory bobbed about like a ball on the swell and cross-currents it met. I was a badly frightened dog, and had serious thoughts of jumping overboard, swimming for the breakwater and then clambering back along the rocky wall to the shore, but the breakers foamed so threateningly about the rocks that I hardly dared risk the landing, and so sat trembling in terror at master's feet, while Tom and John pulled strong, steady strokes at their oars to bring the dory out of the treacherous cross-currents, and laughed and joked as if but three feet, instead of as many fathoms, of water lay beneath them.

Soon, however, my fears subsided somewhat. It was not so "choppy" as we went on. I began to enjoy rid-

From "Pup: the autobiography of a Greyhound." Copyright, 1905. By H. M. Caldwell & Co., Boston. By permission.

ing over the long, gentle swells. I liked it far better than lying at anchor while they were fishing and bobbing uneasily about, and having slimy cunners flopping at my feet in the bottom of the dory, pricking my legs and sides with their sharp fins. I was very glad, however, that I endured it so patiently; otherwise, I would not have been taken out again, and would have missed making an acquaintance on a subsequent trip which gave me unspeakable delight. There are so few dogs, you know, with whom a greyhound really cares to cultivate a friendship.

I behaved so admirably that I was allowed to go whenever there was room in the dory for me; so, when Tom and John planned one morning to row master and Mr. Morrison around Lighthouse Island, where they could get an unobstructed view of the tower and see the ugly reefs at low tide, I was allowed to go with them. There were so many trees on the little island that only the top of the tower with its lantern could be seen above them from the cottages on shore. My friends, as well as myself, had all learned to watch for its first gleam of light at sundown, and then wait expectantly for the huge lantern to revolve and send another red glow over the tree-tops and across the bay. But, on this occasion, we were not only to see the tower and the reefs, but I was to find a new friend under most novel and thrilling circumstances. I suppose Tom must have known all about it; but he had no way of making a greyhound understand, except by bringing him out to see for himself.

We circled a spur of the island that pointed across to the opposite shore of the bay where the twin tower stood, dividing duty and honours with its mate of Lighthouse island; still farther around we rowed, until our dory lay dancing on the waves perilously near the jagged rocks that bulwarked the seaward shore at the foot of the tower. On the extreme edge of the island, between the tower and the sea, and near the keeper's cottage, a huge fog-bell was suspended. Several times we had heard its melancholy tones, as the bell moaned in muffled vibrations through the dense, white blanket of fog that now and then enveloped our pretty bay like the cloak of some

malicious spirit of the sea. I had not known what it meant—that weird, unearthly voice sounding across the water. But as we rounded the island and approached the reefs, a magnificent collie came bounding down to the shore where the bell hung, and, after barking frantically at our boat for a few minutes, rushed to the big bell, seized the rope in his teeth, and, with violent jerks, sent the massive iron clapper clanging against its sides, until the keeper came running down to see what danger was threatening.

He called Collie off and shouted to master; then Tom, making a trumpet of his hands, hallooed back. I didn't know just what was said between the men, — I was too interested in the dog, — but when Collie rushed so excitedly down to the shore, he had barked out: "Keep off! Keep off! There are dangerous rocks underneath your boat. Go back, go back! Bow, wow, wow! Go back! Go back!" and he would not be pacified until Tom pushed out into deeper water.

"Hello, friend!" I barked back, as soon as I could get in my bow-wow. "You are an uncommonly bright dog; I'd like to make your acquaintance. Can't you come over to the mainland to see a summer visitor?"

"No," answered Collie; "I can't leave home. I have to tend the fog-bell. But come over here to see me. Tow knows me well; it will be all right. I am a proper dog for you to associate with. Can't you come?"

"I would like to, immensely," I barked in reply; "but it's too tough a swim. Besides, I hate water! I wish Tom would go ashore!"

And presently he did. They made a difficult landing on another part of the island, — difficult, for the whole of its coast was more or less rock-bound, — and, while the keeper took the men up to his cottage and the tower, I visited with Collie.

"You are a wonderful dog, Collie!" I said, looking at him admiringly. "Lots of dogs do things — just everyday things, like watching out for thieves and swimming after sticks and nosing out rats; but it takes a most

"COLLIE" OF THE FOG BELL

This is a picture from life of the wonderful dog in the act of ringing the bell on the light-house rock in foggy weather, to warn the sailors of the dangerous reefs that encircle it. See the story with this title.

wonderful dog to ring a fog-bell and warn people away from these dreadful rocks. I am so glad to know you, Collie! I wish you lived over on the mainland, where we could play together, I admire you so much! I'm really a very fine dog myself, and know a fine dog when I meet one; and you really are a very superior dog, Collie."

I put on my most dignified manner because I wished my new friend to feel that I was in every way worthy the confidence of a noble creature like himself, and he responded so graciously to this complimentary spirit that my call proved a delightful one in every way.

I was sorry when it was time to leave, but Tom patted "Sailor" — for we learned from the keeper that this was Collie's name — and frolicked a bit with him, and assured him I would come again; so we said a reluctant good-bye and pushed off for home.

Tom took me over to Lighthouse Island many times during the summer, and Sailor and I became very devoted friends. We chased birds and squirrels over the rocks and through the trees, snoozed in the sun under the wide mouth of the fog-bell, and exchanged stories of our various adventures. Sailor thought my life was a real fairy-story book. Sometimes I feel very like a hero, and am afraid I was tempted to swagger a bit in my growing self-esteem.

I told him of the many attempts of my old master to regain possession of me, and Sailor urged me to stay with him on his island, sure that no one would look for me there; but, fond as I had become of Sailor, the thought of Tom and Bertha and Alice was too much for me. I am sure I would not have been contented long, either, for I did not like swimming, and chasing birds is tiresome after a while. As for the fog-bell — that was Sailor's business. I knew, also, that I had pretty nearly reached the end of my stories, and Sailor's life had not been a varied one, — just watching out for careless lobster-dories and inexperienced pleasure-boats, — so he was getting rather short of material for excit-

ing tales, as well as myself. "No," I thought, "it were better to run the risk of the old master's plots against me, than to bury myself on a little isolated island."

"No, Sailor, your little tree-clad, rock-bound island is charming, and you have been a most delightful companion, but I have a dog's duty toward those who have been kind to me; besides, I am really afraid I might be homesick. However, I shall continue to visit you often, Sailor, you may be sure. Good-bye, old fellow!"

Bertha and Alice never accompanied Tom and me on these trips. The landing was so rocky and difficult, I suppose he did not consider it safe for girls; but he took his camera one day, and, while Sailor rang the bell for him,—just as he rang it that first day to warn us off the rocks,—Tom took his picture and here it is.

MASTER ST. ELMO'S FIRST FRIENDS.

BY

CARO SENOUR.

HOW do you do, little people? Permit me to introduce myself. I am St. Elmo, a tan-colored English grey-hound, and I am six years old.

I have a wide, white collar around my neck, a white shirt-front, and white stockings to the knees. On my four feet I have white "Oxford ties;" my face is the color of my body, with a white part in the center of my forehead. My eyes are light brown, to match my hair. I am going to be very personal, and talk a great deal about myself, which is not always becoming, but I wish to impress upon your minds that even a dog can reason, and, therefore, I crave your forgiveness.

From "Master St. Elmo: the autobiography of a celebrated dog." By Caro Senour. Copyright, 1904. The Juvenile Book Company, Chicago. By permission.

I am different from you, little friends, for I am *always* dressed. When I get up in the morning, I shake myself, and my coat and pantaloons are on, my hair is combed and face washed. I do not need a nurse-maid to dress me, but I seem to need one to tag me around, as I never *can* get away without some big person's calling me, or running along to watch where I go. . . .

I was born way down in Texas, and when very young a man took me away from my mother, brothers, and sisters, and brought me to a town in Kansas, called Topeka, where the wind blew so hard that I could not grow any hair; it all blew off; so that is why my hair is so short. A few days after I landed in that very windy town, I was spied by a little boy named James, who told the man that he would give him two of his foxhounds for me (just think! I was worth as much as two other dogs). My! I was glad to go to live with that little boy, for the man was cross and he did not know how to play with puppies, and I felt sure that the boy was taking me for his companion; so, soon we were the best of playfellows. I felt sorry for the other dogs that went to live with the cross man, who had taken me from my relatives (but then I've heard since that human beings sometimes give their babies away), so maybe he was not so very bad. I was only three months old when I went to live with my first little master. He kept me, in the day-time, in a yard with a wire netting around, and oh! how I wanted to get out and play in the other dogs' yards. *You* know, children, other yards and other steps seem so much better than your own, no matter how nice and large yours are. I used to poke my long, pointed nose through the holes in the wire fence when the other dogs passed, the dogs that had such good times seeing the town, and finding their own food and beds. At night I slept on straw in the barn, and wanted my mother and brothers so much. Do you know that all animals' hearts nearly break when they leave their loved ones and their homes? That even the fierce lions mourn when their babies are taken from them, and when they are

deprived of their freedom? I used to cry at night for my mother.

At the end of a week my little master, James, brought home another dog, and we soon became chums, and made things lively about the place. His name was Klondyke — they said he was a gold-mine. Of course I did not know what they meant by that. He was white with one black eye and a black tail. Folks said that he looked as if he had fallen into a coal-bin when coal was twelve dollars a ton, because he did not match all over. Wasn't I glad to have a bed-fellow? He was short and fat, and I was long and lean, but we snuggled together and told each other our troubles, and after a time we felt quite contented with our lot. I rather envied Klondyke, for he was so small that he could sneak out under the fence, and he used to see lots of sights and had real scraps with other dogs. What a hero I thought him when he told me about licking a dog bigger than himself. Sometimes I had to laugh when he came home with the other eye blacked, or his leg bleeding. He had found to his sorrow that he was not the only pugilist in Kansas. I hope you will pardon me for using words like "licking," but my little master said these words, and he was all right I thought, although he often got a whipping for saying such words. My! how hungry I always was before mealtime. I had the scraps left from the table after the big people's dinner, and as there were three dogs, two cats, one cow, a pony, two rabbits, and lots of chickens, sometimes I did not get filled up. I then wished I was an only child.

The family had another dog, a dignified, well-bred fox-terrier, and his name was "Rex" — that means king. He came before we did, so he felt his importance. He took possession of the house, where we were not allowed, and *he,* of course, got the best things to eat. I, being so thin, there was a big place to fill in my stomach, consequently I went to bed hungry many a night, and I don't know whether even now I ever get filled up.

That was a pretty good home, but not the one I have

now, which I will tell you about later. My little master showed partiality (something a parent never should do). He would let Rex follow the pony, and oh! how much Klondyke and I wanted to go. Sometimes Klondyke did follow, and sometimes he came home in a hurry, too, yelping, and glad he was to cuddle down to me; that was when his master had used the whip to drive him back. Don't you think he was mean to us? I tried to be very good, for I was frightened after the first and only whipping that I ever received. Klondyke seemed to forget how the whip felt, for he got lots of wallopings. I caught on from the first who was boss, so I made up my mind to be good, thinking to myself that when the gate was left open by mistake, and my master out of sight, I would run away and go back to my dear mother. I think little boys or girls who had been stolen from their mama would run home as soon as the chance came to do so. How should you like to be stolen from your mother? Well! we doggies have feelings, too, and our poor mothers cry for us, just the same as would yours. The time never came for me to make my escape, but a way opened for me to become an only pet, in the way of a visitor to the family. This visitor was my present mistress, who owns me (although I often hear her tell some one that I own her). When they take me out for a walk I hear them tell folks, "St. Elmo does not follow us, but we follow him." That is a mean thing to say, for a dog has to "rubber" around a little to enjoy himself, but my people want me to be a real dignified, well-bred canine, and walk in a straight line. Do you like to be so precise, boys?

I thought Topeka and that little back yard was the whole world when I was a puppy out there, and that Texas, where I was born, was another little back yard joined on (just as folks say in Chicago, that St. Louis is a suburb of Chicago). Wasn't that a joke, to think all of this big world was just Topeka? Every one makes some mistakes, and I never had studied geography nor traveled, so I want you to pardon me for not knowing

better. Now I know that Chicago is all the world, and that all any one need know is, there is one great world, and that is Chicago. I feel very proud to be a citizen of this wonderful city (don't laugh, boys, I pay my taxes each year, just as all good citizens should do). At times it is a little uncomfortable for a dog, as well as for children, that is when the landlords will not take us in their flats, or hotels, or boarding-houses, or when the conductors will not let us ride in the cars, or the policemen let us play on the grass in the parks; then it is we have a hard time living, and we are greatly alike in our need of sympathy. Then that bugbear of dogs, the "DOG-CATCHER" (I want that name in the biggest type the printers have), keeps us in terror, and even if we have a tag on and are loyal citizens these cruel men will take us when they get a good chance, and then our masters have to go to the "Dog-Pound" and pay five dollars, five great, big, silver wheels, to get us out — lots of poor unlucky dogs are not taken out; then the men kill them with gas, which is said just to put them to sleep and not hurt them; and if this is so, it is a humane way to do.

How I wish every poor dog, horse, and in fact, every animal, could be killed in that way instead of being shot, for animals do not always die with the first shot, but suffer. I hope every one will try not to make us animals suffer, for we are dumb and can't tell our troubles as children can, and we are not responsible for our being here. . . . I was talking of flats and landlords when I switched off on the humane subject, which is my mistress's hobby. I can't say that I exactly blame landlords for refusing to have cats in their houses, for they are really so musical of nights that the other inhabitants can't sleep. They enjoy perching on their neighbor's back fence in the wee hours of a moonlight night and telling their love-songs in such long drawn-out vibratory yowwwwwww-ouuuuuuuuuu's that even a dog holds his ears shut. But then I like cats — most dogs do not. I would play with a cat if she would make friends with

me, but she always sp———————— at me, and puts up her back into such a hump, with her feathers all flying, that I get disgusted, and wonder if she knows how ugly she looks.

That is the way I heard a lady say that her litle boy and girl looked when they were cross and humped up their rose-bud lips; but, of course, I don't think any of my little readers do this, do you? I like to see cats run up a tree; so, sometimes when my mistress is not poking around, I chase them and stand under the tree and bark. I do this with squirrels, too, but I would not kill them, not even a rat. Why should I? I don't want to be killed, do I? Now, I will tell you how I happened to move to Chicago. While I was in Topeka there came to visit at our house a lady and a gentleman. One day while walking in the garden, the lady spied me, at the same time that I spied her. Well! it was "love at first sight." I just ran to her, and she took me right up in her arms and squeezed me so hard that I felt my thin ribs squeak (she didn't mean to hurt me; was just loving me), and I was overjoyed at being petted. But I cannot yet forget a mean thing that she did say about me; when she put me down she said, "My! but he's all legs," and she also said, which I did not understand, that I was "A life boat on sticks." I have forgiven her, however, as I love her very dearly now. After that my life changed, and my living, too, for she wanted to fatten me up before she took me home. To my dismay, one day I heard her say, "We're going home to-morrow," and if you ever saw a dog's jaw drop and his ears droop and his tail fall between his legs, you have seen my picture at that minute. What was I to do? Poor me! I went over in a corner and wished again for my dear mother.

That night I dreamed of cruel men, whips, and bones all night. I ran to the lady (I did not know her name then), in the morning, when she came out in the garden, with my ears and head down and my eyes so bloodshot from crying that she knew in a minute that I was unhappy. She read my thoughts at once, for she said,

"Should you like to go home with me, little dog?" (I had no name as yet.) I jumped up and licked her hand, and wagged my tail so hard that it nearly wagged off — then she knew that I had said "Yes." Turning to my little master James, she said, "Well, James, I will give you three dollars for your yellow purp." Was not that complimentary to me? How my heart thumped against my thin sides, for I knew three dollars was an awful big lot of money. My little master had only pennies to count and spend, so I thought it was a joke, for how could I be worth three big silver dollars? I decided that my days would be spent in the barn. But to my surprise the lady took out three big silver wheels and gave them to my little master, and took me up in her arms for a second time and said, "Well, puppy, you belong to me now, and I shall name you 'St. Elmo.'"

I was as happy as the boy with his first pair of boots or pants with pockets in. I could not thank my new mistress enough, and I will tell you right here that I have never regretted being sold to her. I did have a sorry feeling in my throat when I said "good-bye" to Klondyke, for I knew he would miss me. I tried to tell the lady to buy him, too, but she did not understand me this time — maybe she did know, for I heard her say, "One dog is enough." A year later I heard that Klondyke had another good home, and that he could run and play outside the yard, so he was happy. Poor Rex, the pet of the household, ate some poisoned meat in an alley and died. He was a lovely fox-terrier, and the family all cried when he died.

HIRAM, JINGO AND BABY.

BY

SARAH K. BOLTON.

"More evil is wrought by want of thought than ever by want of heart."

THE increasing winds and cool evenings warned the pleasure-seekers at the mountains and seaside that they must return to furnace-heated houses and indoor life.

The summer had been a delight. Men had brought their families, their servants, and their household pets — their dogs and cats; they had lounged under the trees, fished off the rocks, walked on the beach, been children again with their children, and now must be back at desk, and store, and the cares and conventionalities of city life.

Trunks were packed, and house after house was shut up. Pet cats began to be seen straying about the streets, waiting at back doors where homes were empty, trying to catch birds or whatever was possible in the late autumn, lean and forlorn, and frightened instead of purring when a friendly hand tried to touch them. Could it be possible that even good people could be so cruel as to go back to the city and leave pet cats to starve in the winter, or, when going into the country, to leave them to die of thirst and hunger on the hot paved streets of the city?

The Wesseltons seemed to be the very last family to return to town. All was excitement as the children gathered up their playthings and made ready, reluctantly, to go away to the train. "Where is the basket for the kittens, mamma? We've had such fun with them! Won't they enjoy the bed in our room, and what will they think of our big house and soft rugs? Won't they

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play before the fire, and like the bed we make up for Topsy? — the latter a pet dog.

"Oh, Carrie, we can't take those half-grown cats to town. We must leave them here," replied the mother.

"Why, mamma," answered the astonished child, "Jingo will starve, and little Baby will freeze. She is so gentle, she won't know how to catch things, and besides, the things will all go away in the winter, when the snow comes, and then she can't find any."

"Oh, she'll go miles to some farmhouse, and the people will take her in as you have done, because she is so pretty. Jingo is big, and he can fight his way with the dogs."

"I guess there won't be any dogs to fight," said Carrie, "but there will be lots of lonesome cats." Tears gathered in the eyes of little Carrie, and her sister Marion looked equally downcast.

Pleading did not avail. Mrs. Wesselton was not hard-hearted. She did as most of her neighbors did, let her children enjoy the cats and pretty kittens in the summer. and turned them out to die in the winter, without seeming to realize the cruelty of it.

To soothe the feelings of the children, Mrs. Wesselton assured them that if the cats found no home at farm-houses, they would stay in the shed, in the straw, and Hiram, the coachman, would come down in a few weeks, look after the summer home, and bring the cats some food. Weeks did not seem to Mrs. Wesselton a long time for cats to wait for food and drink.

The Wesselton carriage drove away with nurse and children, who turned wistfully back and saw the half-grown Maltese cats looking after them — perchance, knowing that they were to be abandoned.

For days after reaching the city, Carrie and Marion talked about their pets; wondered if they had any breakfast or supper, if they missed the girlish petting, if they remembered the play with ball and string, if they had really found the farm-houses, which were, in reality, a great way off, and if they would be warm when the

FAMILY PETS

Here is a household where the family pets will never be left to starve. Grandfather, Mama and baby are as much interested in the baby pup and the mother dog's love for it as we are interested in looking at the whole group, which is a charming scene of family happiness.

winter came. They realized how deeply they missed the kittens, who had followed them like little dogs, who had slept in their laps in the sunshine, and nestled in their necks when all frolicked on the grass.

Hiram did not go to the country as soon as was expected. There were many matters to be attended to before the city house was in good order, and Hiram was useful everywhere. At last, about the middle of December, there came time for him to go to the summer home, to see if all was safe as when he left it, and, incidentally, to see if the cats were still there.

"Look for Jingo," said the children, "but especially for Baby. She must have cried so hard, poor thing."

Hiram reached the place, found the furniture uninjured, and then looked about for the pets. Of course, he did not much expect to find them. There was not a living person about, the snow was on the ground. He called "Jingo!" but received no answer. The cat had died of cold and hunger, probably, or had wandered far away, possibly still suffering, but more likely dead.

Then Hiram called "Baby!" and thought, under the edge of the shed floor, he heard a faint cry. He got down on his knees and looked. Baby saw him, and attempted to crawl out. At her side lay four little dead kittens, nearly famished before birth, and dead afterward from starvation. "Baby! Baby!" said the man, with a tremor in his voice, "here is food for you!" for he had not forgotten to bring some, thinking there was a slight possibility that he might need it.

The poor, gaunt creature crawled out, almost too faint to lick his hand, and quite too weak to eat the food which he had brought. He took her in his arms, folded his coat about her, and tried to warm her back to life. It was too late. The neglected thing tried to crawl into his vest, as if longing for the affection she used to receive. Then she seemed to have a slight convulsion, as though the seeing of a friend was too great a strain upon an already weakened heart, stretched out the skeleton paws, mewed faintly, as if in pain, and died. Hiram buried Baby and

her four kittens, and took back the mournful news to Mrs. Wesselton and the children. Carrie and Marion cried as though their hearts would break. Mrs. Wesselton was sorry for the children, and astonished, because she thought, with thousands of others, that cats could live somehow, despite starvation and freezing, or, indeed, like so many others, when leaving city homes for the country or country homes for the city, she did not give much thought to poor dumb creatures. She regretted her cruelty to Jingo and Baby and their kittens as long as she lived.

MOTI GUJ — MUTINEER.

BY

RUDYARD KIPLING.

ONCE upon a time there was a coffee-planter in India who wished to clear some forest land for coffee-planting. When he had cut down all the trees and burned the underwood, the stumps remained. Dynamite is expensive; and slow fire is slow. The happy medium for stump clearing is the lord of all beasts, who is the elephant. He will either push the stump out of the ground with his tusks, if he has any, or drag it out with ropes. The planter, therefore, hired elephants by ones and twos and threes, and fell to work. The very best of all the elephants belonged to the very worst of all the drivers or mahouts; and this superior beast's name was Moti Guj. He was the absolute property of his mahout, which would never have been the case under native rule; for Moti Guj was a creature to be desired by kings, and his name, being translated, meant the Pearl Elephant. Because the British government was in the land, Deesa, the mahout, enjoyed his property undisturbed. He was dissipated. When he had made much

money through the strength of his elephant, he would get extremely drunk and give Moti Guj a beating with a tent-peg over the tender nails of the forefeet. Moti Guj never trampled the life out of Deesa on these occasions, for he knew that after the beating was over, Deesa would embrace his trunk and call him his love and his life and the liver of his soul, and give him some liquor. Moti Guj was very fond of liquor — arrack for choice, though he would drink palm-tree toddy, if nothing better offered. Then Deesa would go to sleep between Moti Guj's forefeet, and as Deesa generally chose the middle of the public road, and as Moti Guj mounted guard over him, and would not permit horse, foot, or cart to pass by, traffic was congested till Deesa saw fit to wake up.

There was no sleeping in the daytime on the planter's clearing: the wages were too high to risk. Deesa sat on Moti Guj's neck and gave him orders, while Moti Guj rooted up the stumps — for he owned a magnificent pair of tusks; or pulled at the end of a rope — for he had a magnificent pair of shoulders — while Deesa kicked him behind the ears and said he was the king of elephants. At evening time Moti Guj would wash down his three hundred pounds' weight of green food with a quart of arrack, and Deesa would take a share, and sing songs between Moti Guj's legs till it was time to go to bed. Once a week Deesa led Moti Guj down to the river, and Moti Guj lay on his side luxuriously in the shallows, while Deesa went over him with a coir swab and a brick. Moti Guj never mistook the pounding blow of the latter for the smack of the former that warned him to get up and turn over on the other side. Then Deesa would look at his feet and examine his eyes, and turn up the fringes of his mighty ears in case of sores or budding ophthalmia. After inspection the two would "come up with a song from the sea," Moti Guj, all black and shining, waving a torn tree branch twelve feet long in his trunk, and Deesa knotting up his long wet hair.

It was a peaceful, well-paid life till Deesa felt the return of the desire to drink deep. He wished for an orgie. The little draughts that led nowhere were taking the manhood out of him.

He went to the planter, and "My mother's dead," said he, weeping.

"She died on the last plantation two months ago, and she died once before that when you were working for me last year," said the planter, who knew something of the ways of nativedom.

"Then it's my aunt, and she was just the same as a mother to me," said Deesa, weeping more than ever. "She has left eighteen small children entirely without bread, and it is I who must fill their little stomachs," said Deesa, beating his head on the floor.

"Who brought you the news?" said the planter.

"The Post," said Deesa.

"There hasn't been a post here for the past week. Get back to your lines!"

"A devastating sickness has fallen on my village, and all my wives are dying," yelled Deesa, really in tears this time.

"Call Chihun, who comes from Deesa's village," said the planter. "Chihun, has this man got a wife?"

"He?" said Chihun. "No. Not a woman of our village would look at him. They'd sooner marry the elephant."

Chihun snorted. Deesa wept and bellowed.

"You will get into difficulty in a minute," said the planter. "Go back to your work!"

"Now I will speak Heaven's truth," gulped Deesa, with an inspiration. "I haven't been drunk for two months. I desire to depart in order to get properly drunk afar off and distant from this heavenly plantation. Thus I shall cause no trouble."

A flickering smile crossed the planter's face. "Deesa," said he, "You've spoken the truth, and I'd give you leave on the spot, if anything could be done with Moti Guj while you're away. You know that he only will obey your orders."

"May the light of the heavens live forty thousand years. I shall be absent but ten little days. After that, upon my faith and honor and soul, I return. As to the inconsiderable interval have I the gracious permission of the heaven-born to call up Moti-Guj?"

Permission was granted, and in answer to Deesa's shrill yell, the mighty tusker swung out of the shade of a clump of trees where he had been squirting dust over himself till his master should return.

"Light of my heart, protector of the drunken, mountain of might, give ear!" said Deesa, standing in front of him.

Moti Guj gave ear, and saluted with his trunk.

"I am going away," said Deesa.

Moti Guj's eyes twinkled. He liked jaunts as well as his master. One could snatch all manner of nice things from the roadside then.

"But you, you fussy old pig, must stay behind and work."

The twinkle died out as Moti Guj tried to look delighted. He hated stump-hauling on the plantation. It hurt his teeth.

"I shall be gone for ten days, oh, delectable one! Hold up your near forefoot and I'll impress the fact upon it, warty toad of a dried mud-puddle." Deesa took a tent-peg and banged Moti Guj ten times on the nails. Moti Guj grunted and shuffled from foot to foot.

"Ten days," said Deesa, "You will work and haul and root the trees as Chihun here shall order you. Take up Chihun and set him on your neck!" Moti Guj curled the tip of his trunk, Chihun put his foot there, and was swung on to the neck. Deesa handed Chihun the heavy ankus — the iron elephant goad.

Chihun thumped Moti Guj's bald head as a paver thumps a curbstone.

Moti Guj trumpeted.

"Be still, hog of the backwoods! Chihun's your mahout for ten days. And now bid me good-bye, beast after mine own heart. Oh, my lord, my king! Jewel of

all created elephants, lily of the herd, preserve your honored health; be virtuous. Adieu!"

Moti Guj lapped his trunk round Deesa and swung him into the air twice. That was his way of bidding him good-bye.

"He'll work now," said Deesa to the planter. "Have I leave to go?"

The planter nodded, and Deesa dived into the woods, Moti Guj went back to haul stumps.

Chihun was very kind to him, but he felt unhappy and forlorn for all that. Chihun gave him a ball of spices, and tickled him under the chin, and Chihun's little baby cooed to him after work was over, and Chihun's wife called him a darling; but Moti Guj was a bachelor by instinct, as Deesa was. He did not understand the domestic emotions. He wanted the light of his universe back again — the drink and the drunken slumber, the savage beatings and the savage caresses.

None the less he worked well, and the planter wondered. Deesa had wandered along the roads till he met a marriage procession of his own caste, and, drinking, dancing, and tippling, had drifted with it past all knowledge of the lapse of time.

The morning of the eleventh day dawned, and there returned no Deesa. Moti Guj was loosed from his ropes for the daily stint. He swung clear, looked round, shrugged his shoulders, and began to walk away, as one having business elsewhere.

"Hi! ho! Come back, you!!! shouted Chihun. "Come back and put me on your neck, misborn mountain! Return, splendour of the hillsides! Adornment of all India, heave to, or I'll bang every toe off your fat forefoot!"

Moti Guj gurgled gently, but did not obey. Chihun ran after him with a rope and caught him up. Moti Guj put his ears forward, and Chihun knew what that meant, though he tried to carry it off with high words.

"None of your nonsense with me," said he. "To your pickets, devil-son!"

"Hrrump!" said Moti Guj, and that was all — that and the forebent ears.

Moti Guj put his hands in his pockets, chewed a branch for a toothpick, and strolled about the clearing, making fun of the other elephants who had just set to work.

Chihun reported the state of affairs to the planter, who came out with a dog-whip and cracked it furiously. Moti Guj paid the white man the compliment of charging him nearly a quarter of a mile across the clearing and "Hrrumping" him to his verandah. Then he stood outside the house, chuckling to himself and shaking all over with the fun of it, as an elephant will.

"We'll thrash him," said the planter. "He shall have the finest thrashing ever elephant received. Give Kala Nag and Nazim twelve foot of chain apiece, and tell them to lay on twenty."

Kala Nag — which means Black Snake — and Nazim were two of the biggest elephants in the lines, and one of their duties was to administer the graver punishment, since no man can beat an elephant properly.

They took the whipping chains and rattled them in their trunks as they sidled up to Moti Guj, meaning to hustle him between them. Moti Guj had never, in all his life of thirty-nine years, been whipped, and he did not intend to begin a new experience. So he waited, waving his head from right to left, and measuring the precise spot in Kala Nag's fat side where a blunt tusk could sink deepest. Kala Nag had no tusks; the chain was the badge of his authority; but for all that he swung wide of Moti Guj at the last minute, and tried to appear as if he had brought the chain out for amusement. Nazim turned round and went home early. He did not feel fighting fit that morning, and so Moti Guj was left standing alone with his ears cocked.

That decided the planter to argue no more, and Moti Guj rolled back to his amateur inspection of the clearing. An elephant who will not work and is not tied up is about as manageable as an eighty-one-ton gun loose on a ship in a heavy seaway. He clapped old friends on the back

and asked them if the stumps were coming away easily; he talked nonsense concerning labor and the inalienable rights of elephants to a long "nooning;" and, wandering to and fro, he thoroughly demoralized the garden till sundown, when he returned to his picket for food.

"If you don't work, you shan't eat," said Chihun, angrily. "You're a wild elephant, and no educated animal at all. Go back to your jungle."

Chihun's little brown baby was rolling on the floor of the hut, and stretching out its fat arms to the huge shadow in the doorway. Moti Guj knew well that it was the dearest thing on earth to Chihun. He swung out his trunk with a fascinating crook at the end, and the brown baby threw itself shouting, upon it. Moti Guj made fast and pulled up till the brown baby was crowing in the air twelve feet above his father's head.

"Great Lord!" said Chihun. "Flour cakes of the best, twelve in number, two feet across and soaked in rum, shall be yours on the instant, and two hundred pounds' weight of fresh-cut young sugar-cane therewith. Deign only to put down safely that insignificant brat, who is my heart and my life to me!"

Moti Guj tucked the brown baby comfortably between his forefeet, that could have knocked into toothpicks all Chihun's hut, and waited for his food. He ate it, and the brown baby crawled away. Moti Guj dozed and thought of Deesa. One of many mysteries connected with the elephant is that his huge body needs less sleep than anything else that lives. Four or five hours in the night suffices — two just before midnight, lying down on one side; two just after one o'clock, lying down on the other. The rest of the silent hours are filled with eating and fidgeting, and long grumbling soliloquies.

At midnight, therefore, Moti Guj strode out of his pickets, for a thought had come to him that Deesa might be lying drunk somewhere in the dark forest with none to look after him. So that night he chased through the undergrowth, blowing and trumpeting and shaking his ears. He went down to the river and blared across the

shallows where Deesa used to wash him, but there was no answer. He could not find Deesa, but he disturbed all the other elephants in the lines, and nearly frightened to death some gypsies in the woods.

At dawn Deesa returned to the plantation. He had been very drunk indeed, and he expected to get into trouble for outstaying his leave. He drew a long breath when he saw that the bungalow and the plantation were still uninjured, for he knew something of Moti Guj's temper, and reported himself with many lies and salaams. The night exercise had made him hungry.

"Call up your beast," said the planter; and Deesa shouted in the mysterious elephant language that some mahouts believe came from China at the birth of the world, when elephants and not men were masters. Moti Guj heard and came. Elephants do not gallop. They move from places at varying rates of speed. If an elephant wished to catch an express train he could not gallop, but he could catch the train. So Moti Guj was at the planter's door almost before Chihun noticed that he had left his pickets. He fell into Deesa's arms trumpeting with joy, and the man and beast wept and slobbered over each other, and handled each other from head to heel to see that no harm had befallen.

"Now we will get to work," said Deesa. "Lift me up, my son and my joy."

Moti Guj swung him up, and the two went to the coffee-clearing to look for difficult stumps.

The planter was too astonished to be very angry.

CATS I HAVE KNOWN.

BY

Arthur H. Beavan.

I DO not remember whether amongst the animals that figured in the Noah's Arks of our childhood a pair of cats were included. I fancy not. But we may be perfectly sure that they entered that place of safety comfortably seated on some creature's back or carried in by one of the Misses Noah, for cats have always been characterised by their great love of comfort, and — deny it as their admirers may — with an intense love of self. If a cat does not want to do a thing, it will not do it, unless absolutely compelled; and performing cats always seem to be acting under bitter protest.

Mr. G. A. Henty summarises their character to a nicety. He maintains that they have never been really domesticated, that they are inclined to revert to wildness at any fitting opportunity, and are rapturous when out of doors and at liberty, while placidly indifferent at home, restraint being alien to their tribe; that their assumption of family habits is a kind of hypocrisy; that they submit to caresses simply because they like them, and, with equal show of affection, will rub themselves against the legs of a table or the legs of a man; and that, however well-fed, domestic cats retain their predatory and thievish tendency.

Mr. Henty winds up his indictment against Cats by declaring that often when apparently in deep and peaceful contemplation, they are maturing plans for new villainy and mischief; that they have no real love for their owners, that they have many vices, are erratic, noisy, and a torture at night, and that their sole recommendation is softness, a quality they share with many other

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animals. "Why," he asks, "should cats always have been pets, especially women's pets. Is there any resemblance in their dispositions?" and goes on to observe that the reason no Chancellor of the Exchequer has ever been induced to impose a tax on pussies (a most reasonable proposal) is because he is generally a married man with cats of his own.

Now let us consider both sides of the feline character. Let the Advocatus Diaboli have his say and also listen to something in favour of Grimalkin.

Well, cats were sacred creatures long before the institution of the National Cat Club, and Cat Shows. In Egyptian temples great cats blinked on luxurious cushions, and the priests made obeisance to them as they passed; while cats with peculiar "markings" were set apart for special veneration. The tribe was typical of the qualities held by the goddess Bubastis, herself typical of one of the qualities of God.

To kill, even by accident, a Temple cat, was unpardonable, punishable by death; and when one of these worshipful creatures departed this life it was solemnly mummified.

Yet ordinary cats, although revered, were, in spite of their instinctive dislike of water, trained to utilitarian purposes, such as retrieving dead wild fowl from canoes on the Nile. No doubt such cats were valuable, but the price they fetched was trifling compared to the pedigree cats of the present day. A cat described as a "Blue Persian," and rejoicing in the name of Roy, was once the subject of a lawsuit in the High Court of Justice, England. It was appraised at one hundred pounds, having won every prize of its class in many shows.

Here I must digress, and relate two instances of a cat's moral delinquency.

In my youth we had a beautiful Tom called Whiskers, apparently gentle and trustworthy. He was fed upon the daintiest of cat fare, and was a universal favourite, contented and happy. Alas! we also kept pigeons in what was considered an inaccessible loft. The most

beautiful amongst them were Tom and Una, spotlessly white little fantails, my sister's greatest treasures, that used to sit upon her shoulder and take grain from between her lips. Tom and Una were inseparable; theirs was not a *mariage de convenance,* but a love match. Whiskers one night contrived to enter Tom's abode and slaughtered the lovely Una, evidence of the crime being patent the next morning on the cat's jaws.

A jury of not altogether impartial boys was immediately impanelled, and none of its members were challenged. Direct evidence was forthcoming for the prosecution and there was no defense. Whiskers was found guilty and the death sentence pronounced, which was then and there carried into effect through the medium of a stout cord, a heavy brick, and a deep pool. But nothing could bring back Una, or console Tom, who refused to eat; his feathers drooped, he pined away, and died of grief. One of my brothers, who had never been known to cry since he was a baby, wept bitter tears at the graveside of poor little Una.

Then when we removed to London we had a cat, a jet black Tom, a magnificent creature, pampered and petted in the kitchen (it never condescended to visit the drawing-room), where it "had its meals reg'lar." It could never by any possibility have experienced the pangs of hunger, yet the thieving instinct compelled it, as soon as the game season came round, to forage in our neighbour's larder, and frequently it brought back a cold pheasant or partridge. At last, tired of apologising for the cat's conduct, and of having to replace the missing birds, we got rid of the thief.

Now for an example of feline intelligence, showing how an alert cat saved the lives of an entire family. At Braintree, England, in the early hours of morning, when sleep is heaviest, the head of the house was awakened by the cat mewing, evidently in deep distress, so loud it was and so persistent. He went down at once into the kitchen and found it full of smoke, and a cupboard blazing. Owing to Tibby's timely warning, however, the

flames were easily extinguished, and it was discovered that a lighted pipe had been left in the pocket of a coat hanging outside the cupboard door.

Was that watchful cat a descendant of the two good cats mentioned in "Struwelpeter," who warned foolish Harriet not to play with the matches, and who reproachfully cried "Me-ow, me-ow," over her smoking ashes?

A similar incident occurred in a lonely part of Essex, England, where, one market day, a farmhouse was left in sole charge of an old woman. The cat persisted in coming to the kitchen and mewing, and going out again. She did this so many times that at last the ancient dame followed Pussy, who led her to a barn where, concealed in a corner, was a villainous-looking tramp, who, after knocking the poor old woman down, decamped — foiled by a cat!

Cats have a marvellous faculty for finding their way over utterly unknown ground. Many years ago a gentleman had to remove from one district to another, a distance of ninety miles, and it so happened that he could not take his cat with him. A few days after settling down, what was his surprise to see the servant, who was bringing in the tea, followed by a cat exactly like the old favourite he had left behind. He examined it closely, and could discern no difference between it and his own cat; furthermore it knew him. Finally he looked at its claws, and their worn condition convinced him that, extraordinary as it might seem, puss had "padded the hoof" for nearly a hundred miles over unknown ground to rejoin her old friend.

But an even longer journey was taken by another cat. She had lived all her life in Northumberland until her mistress gave her away to some people in Essex, whither poor pussy was conveyed by train. After a few days the cat was missing from her new quarters, and later on in the week was found sitting on the doorstep of her old home. On the door being opened, pussy entered and searched every room. She recognized her friends, and

rubbed against them and purred. She was very thin, and looked as though she had had a somewhat rough time, at which there can be little wonder, seeing that the distance from Chelmsford to Bedlington is some three hundred miles. Surely this is a record "cat-walk!"

What is the secret of this wonderful faculty? They have many difficulties to overcome while travelling, and do not, like dogs, tramp along the high-roads, but slink by the hedgeside, and have to run the gauntlet of thoughtless boys and chasing dogs.

Cats, though able to climb, are not arboreal, and I think show to least advantage when on a tree; they look awkward, are hesitating in their movements, and seem uncertain how to get down again.

A Persian cat once mounted the highest bough of the loftiest tree in a London Square, no doubt in pursuit of some attractive but elusive sparrow. It then discovered that it was easier to get up the tree than it was to descend, and there it remained dismally howling and helpless for ten days, until, none too soon, it was rescued by means of a couple of ladders lashed together and placed against the elm. An active boy then went up the extemporized "fire-escape," shook the half-starved cat off the branch, and pussy landed safely on a jumping-sheet below.

Cats do not readily profit by experience, and learn nothing from their misfortunes. In a warehouse where many cats were kept for the destruction of rats and mice, there resided a clever parrot. The cats were regularly fed, and the cat's-meat purveyor's cry was heard heralding their food at a certain hour every day but Sunday.[1] Poll, after many private rehearsals, learnt to imitate his cry to perfection; and one Sunday when the cats were dozing in various parts of the granary, dreaming of fish and unattainable plump sparrows, they were wakened with astonishment by the welcome cry, "Mee-at, mee-at!" Surely they had not mistaken the day! It

[1] In England the selling of cats' meat is a regular business; the venders carrying it from door to door on a wheelbarrow, carving it in the street where they are generally surrounded by a mob of hungry cats.— C. W.

must be *Saturday!* Yes! There was the beloved cry, clear and unmistakable.

In a minute a dozen Toms, Tabbies, and Tibbies, with tails erect and eager anticipation on their faces, advanced to the spot whence came the cry. Alas! they could see no cat's-meat man, nor any living thing but Poll, who gravely stood on her perch. In a group they approached her, when, as though suddenly struck by the absurdity of it all, she lowered her head and shouted, "Oh, you fools!" and the humiliated cats departed with tails and spirits depressed. Sunday after Sunday Poll repeated the trick, and always with the same result — the cats never learned that it was a hoax, and people often went to watch the singular performance, concealing themselves from the observation of cats and parrot.

An American lady, shut up in Port Arthur during the bombardment, tells of the behaviour of cats under heavy fire. "When the big shells began to fall during the day," she says, "five or six cats used to come out on to the roof opposite my house. At each gunshot the cats arched their backs and stiffened their legs, and seemed both terrified and furious. Then when a hissing shell arrived, it gave the signal for a frightful battle. They jumped at each other like raging tigers, and seemed to hold each other responsible for what was taking place. The effect was so comical that we could not help laughing, though the occasion was not one to inspire gaiety."

A cat with kittens will face anything. I was passing along a narrow street in a Cornish town with my two Clumber spaniels following me at a little distance, when I heard a frightful yell, and Flash came tearing up with a cat on his back clawing away like a fury. Flash had unwittingly trotted beneath an open window where reposed a feline matron with her two kittens. He had done no wrong, but his presence was sufficient cause of offence to convert the mother into a miniature panther. I had some difficulty in relieving Flash of his burden, and I was thankful it was his back and not his head that was clawed.

A corner of my garden where the creeeper grows very thickly was appropriated one summer by a strange cat and her brood. I was not aware of this until one day, when hunting among the luxuriant growth for a lost tennis ball, a spitting fiend sprang out at my face, luckily just missing it. She was a very small cat, but as brave as a lioness. However, I had her and her interesting family promptly removed.

That it does not do to interfere, wittingly or unwittingly, with a mother cat, the following will show. Some kittens belonging to a Maltese cat were temporarily deposited for safety in a perambulator. The nursemaid, not observing them, carefully placed the baby in the perambulator. Instantly the Maltese sprang desperately upon the child. To rescue it was most difficult, for the cat flew savagely at every one who approached. At last a courageous woman managed to divert the cat's attention, while three others, wrapped in heavy rugs, flung themselves upon the perambulator, and saved the baby.

Mother cats sometimes take strange likings to the young of animals and birds, especially when deprived of their own offspring. Thus a Tibby recently took temporary charge of six newly-hatched chickens, carefully protecting them from injury. Another acted as foster-mother to ten ducklings until they were grown up, and was greatly alarmed when they entered the water after the manner of their kind.

Cats are apparently unaffected by heat or cold, or indeed by any discomfort. I have seen as many as six unconcernedly sitting on a snow-covered wall, and a cat I knew well used to nestle deliberately on a garden wall covered with pieces of sharp broken glass (placed there for the purpose of keeping cats away!) and seemed actually to prefer it to the soft grass plot.

Weather lore abounds with references to cats, such as, "When cats sneeze it is a sign of rain;" "While rain descends the pensive cat gives o'er her frolics and pursues her tail no more."

Respecting dietary, cat-lovers often make a great mis-

take in giving their pets only milk to drink. Water is their natural beverage, and, like all carnivora, they require it in abundance. Grass, too, is an essential. Meat is good in moderation, though I have known cats utterly reject liver, and eagerly devour cold potatoes, asparagus, lettuce, beans, and bread.

Upon some such vegetarian diet, Chinese cats are reared for consumption. In Canton may be seen hanging round certain shop-fronts the trussed bodies of Grimalkins, and very funny they look with their white, naked bodies, each with its furry tail left on — tabby, tortoiseshell, or black — to guarantee its being a veritable cat, and not a mere rabbit. But most of the cats exposed for sale in China are sold as curiosities, only a few for eating.

Their aversion to getting wet does not prevent cats from catching fish, which, on the whole, seems to be their favourite food. On board ship they seem to change their nature and paddle about in the scuppers, often getting drenched by the spray, and go wild with excitement when a fish is caught. I shall never forget the antics of the forecastle cat in trying to seize the heart of a large shark that had been killed and gutted. The heart moved about in so uncanny a fashion from muscular contraction that pussy fled aghast, and did not appear again that day.

Cats are brought on board by sailors "for luck." I have known a dozen to be shipped, not one of which survived the voyage, for Jack kills them with kindness, and a diet of salf-beef and pork varied by pea-soup, tea, and biscuit is hardly conducive to cat longevity. For "luck," cats have to endure much, and the aeronaut Dr. Barton once took with him in his airship three black pussies, Botha, De Wet, and Evans.

No doubt cats are strange creatures, and are fittingly chosen as the companions and familiar spirits of witches. "Ingoldsby Legends" speaks of the gossips —

> "As they sat in that old and haunted room,
> In each one's hand was a huge birch broom,
> On each one's head was a steeple-crowned hat,
> On each one's knee was a coal-black cat."

In fiction cats figure almost as prominently as dogs. From memory I will refer to a few — Dick Whittington's of course stands first; then Robinson Crusoe's rather uninteresting cat. There is an awful spectral cat in one of Edgar Allan Poe's tales; there is Doctor Nikola's black cat in Guy Boothby's novel of that name; and there is Mark Antony, the famous cat who did not fail to recognize its favourite, Cyril Maitland — although wearing Dr. Everard's coat — that fatal evening when the future Dean Maitland accidentally committed the murder about which he kept his Silence.

But there are many people who have an unaccountable and unconquerable aversion to these really most interesting animals. Should there be a cat hidden away in a room, the cat-hater instinctively knows it, and cannot rest; either he must leave the room, or the cat must. But, of course, when pussy emerges from her hiding-place, yawning after a doze, she, with strange perversity, goes straight to the antagonistic person. The Great Napoleon held cats in aversion, and it is said that Lord Roberts equally dislikes them.

There are cat-adorers, however, in plenty, though some of them carry their craze a little too far, such as the Truro spinster who lived alone with five hundred cats running about the house, until she was very rightly ejected from the premises.

And now to conclude with a few cat stories.

We all know that it is considered unlucky to kill a black cat; and when I had the misfortune to cause the death of one, everybody reminded me of the superstition and wondered I was not more concerned. The mishap occurred in this way. One superb night in Australia, when the stars were shining like electric-lamps, and the atmosphere was still and clear as possible, I (who was at a sheep station) set out with my host to complete the tale of possum skins I was collecting for a rug (possum-shooting being generally conducted at night).

A mile from the house our dogs gave tongue at the foot of an isolated gum-tree, and there we espied on one of the

branches a fine possum flattened down in the usual manner when tree'd. "Shoot!" whispered my friend. "All right," I replied. I shot, and something heavy plumped down and remained motionless. "My word!" he exclaimed, "that must be a big one!" My friend went up to the quarry, which had fallen into a ditch, but scrambled out with a very long face. "Why, good heavens!" he ejaculated, "we have shot old Tom, my wife's favourite black cat. He must have strayed down the paddock to catch sleeping birds. Poor old chap!"

We retired in mournful silence. The news was broken gently to the distracted household, and I was fully acquitted. Tom received honorable burial the next morning beneath a spreading fig-tree in the orchard, but for a long time I was haunted by the traditional superstition, and almost expected the misfortunes that never came.

Among the cats I have known was a large and very handsome tortoise-shell, most wonderfully well-mannered, who at the luncheon hour used to go to my bachelor's cupboard, open it deftly, and take out its own tablecloth, a square sheet of brown paper, which it spread on the floor by my side, and upon it ate the scraps I bestowed.

There is a story told concerning a Lancashire cat. It appears that a mining official, who had to leave his house every morning at four o'clock, used to carry a lamp downstairs, and the light therefrom shone through the fanlight over the front door. To his astonishment, every time he reached the end of the staircase, the knocker of the door gave a spectral rap, yet when he opened it there was no one there. Each time, however, a soft and furry cat brushed past him into the hall. He investigated the matter, and found that the cat it was that knocked. And so it went on for weeks — every morning directly the light appeared, the cat, who had spent the night in the open, would leap up at the knocker, lift it with its paw, and then drop to the ground waiting for the door to open.

Here is another instance of pussy knowing the time. A cat was brought up with a farm-labourer's family, and

became so devotedly attached to one of the boys, that when the lad was at school, the cat, punctual to the moment at four o'clock in the afternoon, used to slip out through the door, or jump through the window, and go up the lane nearly a mile to meet the boy coming home.

My favourite and lamented black cat must be honoured by this final reference to cats I have known.

Whence came "Uncle Tom"? Who can tell? He may have dwelt in a palace or a slum; but, anyhow, he was homeless when he became an inmate of our house in a somewhat singular manner. We were new arrivals in London, and had been domiciled only a week when we found how much we missed the dear old cat we had left with friends in the north of England. We were expressing our desire to have another in its place, and wondering how we should set about obtaining one, when a black cat quietly walked in by the front door which had been left ajar, and established itself in the kitchen. A moment later another cat entered the dining-room by the back door!

"Well, I declare, here is a black cat!" called out one of us. While we were speaking, up came the maid, calling out with glee, "Oh, if you please, there's *such* a lovely black cat in the kitchen!"

Great excitement prevailed at the extraordinary coincidence. The maid declared that "it was evidently intended we were to have one of them — quite providential like!" Which should it be? We decided that the doors should be left open, and that the cat that chose to remain (if either should so decide) should be welcomed as a friend.

It was soon settled. The later arrival strolled through the premises, entered the kitchen, and courteously recognising the superior rights and privileges of the first comer, who was basking in the warmth of a big fire, departed in a dignified manner. Thus, Uncle Tom — our uninvited guest — took up his abode with us.

Every morning at seven o'clock he would come to the door of each bedroom to wake the occupant, and would

A COURAGEOUS ACT

AFTER THE PAINTING BY A. WEISZ

There is a story in this picture which illustrates the difference between the town-bred and the country-bred child. The little barefooted girl, brought up all her life in friendly and familiar contact with the animals, is perfectly at home with the ungainly, but beautiful little animal. The dainty young lady from town, however, has to be persuaded to get over her fear of the strange creature before she can be induced to stroke it; yet, one can see that in spite of her fear she is as full of loving and friendly interest in the little calf as her country-bred sister

The painter of this picture was born in Hungary, and afterwards became a naturalized Frenchman, such themes as these being always his favorites, and, therefore, his most successful pictures.

continue to me-ow, me-ow, until the reply was given, "All right, Uncle Tom." After calling everybody, he would return to my door, and silently wait until I was dressed, when he would conduct me to the breakfast-room, turning round at every step to make sure I was following. Having seen me safely down, he would go back to bring the others in similar fashion.

Uncle Tom knew our individual knocks at the front door, and, while ignoring the knocks of strangers, always went with the servant to answer it for us; and should the maid be dilatory in attending, he would hasten thither, tap at the inside panels, and me-ow an apology for the delay.

Uncle Tom was wonderfully clever in recognising the names of our friends, especially of those he most liked. Certain names he took no notice of, but when we mentioned the names of any of his favourites, he would, even when apparently dozing, twitch his ears, open his eyes, and show marked pleasure.

Our favourite lived to a good old age, when he became partly paralysed, lost his teeth, and most of his sight. Life was no longer a happiness to clever, genial Uncle Tom, so with great reluctance we consigned him to the fate of Miss Penelope Bird's dog, Tray—

"Afflictions sore long time he bore,
Physicians were in vain!
Grown blind, alas! he'd Prussic Acid,
Which put him out of his pain!"

A CHAPTER ABOUT BEAVERS.

BY

EDMUND SELOUS.

THE beaver may be said to occupy amongst mammals the place that ants do amongst insects. J. G. Wood says of him: "Of the Social Mammalia, he takes the first rank, and is the best possible type of that group. There are other social animals, such as the various marmots and others; but these creatures live independently of each other, and are only drawn together by the attraction of some favourable locality. The beavers, on the other hand, are not only social by dwelling near each other, but by joining in a work which is intended for the benefit of the community."

As everyone knows, the beaver is an aquatic animal as is sufficiently indicated by his appearance. He has a dense, woolly coat, which, as in the case of the otter and the still more water-loving seals, is protected by an outer covering of long, smooth hairs, which are of a reddish brown colour. The toes of the hind feet are webbed, whilst the tail is broadened out into the shape of a paddle, the blade of which, however, lies flat on the water, so that it is not used by the animal as we would use a scull or a paddle, but with an upward and downward motion. When the beaver moves his tail laterally — that is to say from side to side — as he is very well able to do, it cuts the water, after the manner and with the same effect that a scull does when worked by a seaman at the stern of the boat, instead of in the rowlocks as we use it.

This tail of the beaver is a very wonderful organ, and by far the most conspicuous feature about the animal. Mr. Morgan, who made a study of beavers and their habita-

From "The Romance of the Animal World." — London.

tions, says of it: "It is nearly flat, and covered with horny scales of a lustrous black. These scales, which are such in appearance only, cover every portion of the surface, both above and underneath. Its principal uses are to elevate or depress the head while swimming, to turn the body and vary its direction, and to assist the animal in diving. It is also used to give a signal of alarm to its mates. When alarmed in his pond, particularly at night, he immediately dives, in doing which the posterior part of his body is thrown out of water, and as he descends head foremost, the tail is brought down upon the surface of the water, with a heavy stroke, and deep below it with a plunge. The violence of the blow is shown by the spray, which is thrown up two or three feet high."

Elsewhere the same authority says: "Whilst watching upon their dams at night I have been startled by this tremendous stroke, which, in the stillness of the hour, seemed like a pistol-shot. I have heard it distinctly for half a mile, and think it can be heard twice or three times that distance, under favourable conditions." That must have been a splendid thing to hear — that sudden, startling blow — in the dead silence of the night, and in the loneliness of the North American wilderness; in the Hudson's Bay territories perhaps — the headquarters of the beaver — where, for hundreds of miles around, there would be no other white man, or even, perhaps, an Indian, within a very great distance. Any other beaver that happened to be about at the time — at any rate, all those that were living in the same pond — when they heard that sound of alarm would go down too in the same way, so that there would be cracks like pistol-shots all about. That would be a concert worth listening to.

But now, what is this pond of the beavers which is referred to by Mr. Morgan in the above passage of his book, *The American Beaver and His Works* — a most interesting work, which should be read by anyone who wants to know all about beavers? It is made, or rather caused, by the beavers themselves, and this brings us to the dam, which is their principal work, and which they construct

for the express purpose of having this pond to live in. They are animals who simply cannot do without water, and as the streams on which they take up their abode are often small and shallow, it is of the greatest consequence to them that they should never run dry — which in a drought or dry summer they might easily do. To prevent this, having first selected a part of the stream where the water is not more than two or three feet deep, they bring earth from the adjacent banks and lay it down in mid-stream. Soft earth of a clayey consistency is preferred, for this, penetrated as it is, and partially held together, by roots and other vegetable fibres, is not at once washed away by the force of the water. The beavers have thus time to add to and strengthen the dam, and the better to effect this object they lay sticks and brushwood upon it, which they then press down into the mud with their feet. To these stones are added, and then more earth and sticks, till at last the crest of the dam appears above the surface of the water, and begins to rise higher and higher. It may attain, at last, to a height of six feet, or even more, above the level of the stream, whilst the length of some dams is as much as two hundred, or even three hundred feet.

The stream itself, at the point where the dam intersects it, may be a few yards in breadth, but as the mass of the flowing water cannot penetrate the solid embankment of mud and sticks which the beavers have made, it broadens out and begins to make a way on either side of it. The beavers, however, to prevent this, keep lengthening the dam, and in this way, as the stream can no longer flow in its channel, and can only get by the obstacle placed in its way, very slowly, by spreading out and flooding the surrounding country, the result is that a great pond or basin of water is formed on the up-stream side of the dam, and this the beavers have all to themselves. Of course, when the water is checked in its flow, it begins to rise against the dam that confines it, and as only a small quantity percolates through, it sinks and runs away in a much smaller volume, on the other side of the obstruction. When a

flour-mill, which is to be worked by water-power, is erected by the side of one of our small streams, exactly the same principle is employed, a dam being built across it, from bank to bank, and the water running off by a side-channel.

Beavers, however, existed long before there were any millers, and moreover, they make better dams than our millers do, or, at least, they construct them upon more scientific principles. The mill-dam runs, as a rule, straight across the stream, but the beavers curve theirs a little up into it, so that the water does not rush against it so violently as it would if it were straight, but flows smoothly off upon either side. This is how we make our sea-dams — at least when it is possible — and where any structure has to resist a great force of water, as, for instance, the buttresses of a bridge across some large river, it is always shaped like this, only more so; that is to say, we turn the curve into an acute angle and present a sharp edge, instead of a rounded surface, to the impetuous rush of the stream. In this way the water is cut in two, as if by a knife-blade, whereas, if the masonry presented a broad surface for it to rush against the first flood might wash the strongest bridge away. Practical experience seems to have led to the beaver's employment of the principle, though probably he has no very clear ideas as to what the principle is. He could not "formulate it" — as we say — and to say the truth, neither could I myself at this moment.

Besides the first, or great dam, the beaver sometimes makes a smaller one lower down the stream. This smaller dam is perhaps a more interesting structure even than the principal one, from the point of view of the beaver's intelligence. The pond which is formed above it by the now diminished stream is too small to be of much use to the animal, but by increasing the height of the water behind the great dam, it diminishes the pressure of the stream against it, on the other side, so that there is less fear of the dam's bursting. This, too, is by a principle which I should find it difficult to formulate myself —

and it can hardly be supposed that the beaver knows anything about it. The surprising thing is that, somehow, practically, he has found it out — that is to say, he knows how to apply it. In carrying the mud and sticks to the water, the beaver walks, it would seem, upon his hind legs, and in placing and working them together, he generally also assumes the upright attitude. The massive tail, by acting as a base or fulcrum, on which the animal can lean back, enables it to do this with the greatest ease. The toes of the forefeet are not webbed, as are those of the hind ones, nor do they aid in swimming, being then pressed against the body, but are used more as hands, at least for the purposes of architecture. With them the beaver scoops up the mud, and holding it between them or pressed against his throat, walks upright to his dam like a little mannikin in a brown fur coat.

It used to be thought that the broad naked tail served the beaver as a trowel, for the laying and plastering of the mud. This was not so entirely an error as one generally reads it is, since Mr. Morgan tells us that "he uses his tail to pack and compress mud and earth, while constructing a lodge or dam, which he effects by heavy and repeated down-strokes," and he adds, truly enough, "that it performs, in this respect, a most important office, and one not unlike some of the uses of the trowel." This shows that there was really something in the old idea, but it was imagined also that the beaver, besides using his tail as a trowel, actually prepared mortar with it, from mud. This was a fable, but there was much more truth in the general statement, of which this was only an item, than in the learned *ex cathedrâ* denial, which denied everything — and so it very often is. As we have seen, both wood and mud enter into the construction of the beaver's dam, besides stones, which do not play so important a part. I have called the wood "sticks" because that is the word usually employed in America, where beaver-dams are often called "stick-dams." But these sticks may be of a considerable size, often rather

logs, or, at any rate, branches. Branches, gnawed into various lengths, is what they really are, and to obtain them the beaver, which is a rodent, and armed with two enormous chisel-like teeth in each jaw, is accustomed to cut down trees, often of a surprising size, when its own is taken into consideration.

Two or more beavers — according to Mr. Morgan — generally assist in the cutting down of a tree. "Although," he says, "I have not succeeded in witnessing the act, I have obtained the particulars from Indians and trappers who have. The usual number engaged in the work is but two of a pair; but they are sometimes assisted by two or three young beavers. It thus appears to be the separate work of a family, instead of the joint work of several families. When but two are engaged they work by turns, and alternately stand on the watch, as is the well-known practice of many animals while feeding or at work. When the tree begins to crackle they desist from cutting, which they afterward continue with caution until it begins to fall, when they plunge into the pond, usually, and wait concealed for a time, as if fearful that the crashing noise of the tree-fall might attract some enemy to the place. The next movement is to cut off the limbs, such as are from two to five and six inches in diameter and reduce them to a proper length, to be moved to the water and transported thence to the vicinity of their winter provisions. Upon this work the whole family engage with the most persevering industry, and follow it up, night after night, till the work is accomplished."

The houses of the beaver look like little round huts, but they are called lodges.

The "beaver-lodge" is shaped something like a beehive, but flatter and broader at the base, and the walls and roof are very thick — from four to five feet, as a general rule, but sometimes even thicker. It is made of a mass of poles and sticks, the shoots and branches of which the beavers gnaw off, and then strip away the bark. They press and interweave them together, and plaster them with mud, much in the same way as they make their

dams. They thus become fairly solid structures, but still, as the mud cannot get into all the interstices of the sticks, they are sufficiently porous to answer the purposes of ventilation. Inside, the lodge consists of a circular chamber, the floor of which is formed of mud, which is soon pressed hard and worn quite smooth by the feet of its occupants.

These consist of a pair of beavers and their young, and sometimes the young of one or more of these, but the Indians say that it is rare to find more than twelve beavers living together, in the same lodge, because the lodge is not large enough to accommodate more than that number comfortably. From two to five young beavers are born at one time, and when they are two years old, by which time they are almost full-grown, they are not allowed to continue any longer in the parent lodge, but have to go out into the world, to find mates and make lodges for themselves. This, at least, is what the Indians say, and no doubt it must be so, in the greater number of cases. Still as a family of five young beavers, with the two parents, would only make seven in all, and as sometimes more than seven beavers are found living together in one lodge, it seems plain that in these cases some of the young beavers must have stayed in the home circle a little longer, and brought their mates there to live with them. Probably the numbers are in accordance with the size of the interior chamber, for if a beaver felt uncomfortable in his lodge, he would, no doubt, leave it, as we should leave our house or lodgings, but without giving any notice.

As I say, the floor of the beaver-house is of mud, but round the outer border of it, next to the wall, the beavers lay down grass, which they use, both to sleep on and also to make nests for their young. The latter are nourished, for six weeks, by their mother, after which, and for the rest of their lives, they live principally on bark. It is not the thick bark, at the base of the trunks of trees, that beavers like, but that which clothes the smaller limbs, for this is both tenderer and more nutritious. This is one

great reason for the cutting down of trees, so that the beaver was, no doubt, a tree-feller before he came to be a dam-builder, for food comes first, both with men and animals, and houses and engineering works afterward.

It might be thought that, as there are trees to be felled both in summer and winter, the beaver, though he does not hibernate, would find no more difficulty in procuring food in the one season than in the other, so that it would not be necessary for him to store up a supply of it, for winter consumption, either in his lodges or at the bottom of his pond. In reality, however, there are difficulties, and "they are compelled," says Mr. Morgan, "to provide a store of subsistence for the long winters of the north, during which their ponds are frozen over, and the danger of venturing upon the land is so largely increased as to shut them up, for the most part, in their habitations." "In preparing for the winter," Mr. Morgan continues, "their greatest efforts in tree-cutting are made. They commence in the latter part of September and continue through October and into November the several employments of cutting and storing their winter food and of repairing their lodges and dams. Part of this winter supply the beaver, as we have seen, brings into his dwelling, and for this purpose he makes a special entrance to it, which facilitates his doing so. Beaver-lodges are always situated on the edge of the water, and it is by diving under water that the beaver goes in and out of them. The lodge enters the water at one point, and, within the space conterminous with it, there are two or more entrances, which open out beneath its surface at a sufficient depth for the water not to be frozen during the winter; since, if this were the case, the inmates would perish, the walls being, at this time, too hard and solid even for a beaver's teeth.

These entrances are made," says Mr. Morgan, "with great skill and in the most artistic manner. In new lodges there is generally but one, but others are added, with their increase in size, under the process of repairing, until in large lodges there are sometimes three or

four. These entrances are of two kinds, one straight and the other sinuous. The first we shall call 'the wood entrance,' from the beavers' evident design to facilitate the admission into their chamber of the wood-cuttings upon which they subsist, during the season of winter. These cuttings are of such size and length that such an entrance is absolutely necessary for their free admission into the lodge. The other, which we shall call 'the beaver entrance' '' " is the ordinary one for the exit and return of the animal."

Some beavers make a trench all round their huts, and let the water from the pond run into it. Then they make one passage out into the water of this trench, and another into that of the pond. Mr. Wood, in speaking of the beaver-lodges, tells us that " they are nearly circular in form, and much resemble the well-known snow-houses of the Esquimaux, being domed, and about half as high as they are wide, the average height being three feet, and the diameter six or seven feet. These are the interior dimensions, the exterior measurement being much greater on account of the great thickness of the walls, which are continually strengthened with mud and branches, so that, during the severe frosts, they are nearly as hard as solid stone. All these precautions, however," he goes on to say, " are useless against the practised skill of the trappers. Even in winter time the beavers are not safe. The hunters strike the ice smartly, and judge by the sound whether they are near an aperture. As soon as they are satisfied, they cut away the ice and stop up the opening, so that if the beavers should be alarmed they cannot escape into the water. They then proceed to the shore, and by repeated soundings trace the course of the beaver's subterranean passage, which is sometimes eight or ten yards in length, and by watching the various apertures are sure to catch the beavers. This is not a favourite task with the hunters, and is never undertaken as long as they can find any other employment, for the work is very severe, the hardships are great, and the price which they obtain for the skins is now very small." I heartily

wish it were nothing, for then this most interesting and intelligent animal would not be in danger of extermination, as I fear it is now.

The greater number of men and women are, unfortunately, quite callous in regard to what is done to wild animals. They do not see that it is a crime to rob a *being* of its life — only a *human* being; though the distinction, nowadays, is one without a difference. To read, first, of what the beavers do, and then of what we do to them, ought to upset one more than the fall of a ministry, or people in one's pew — but it doesn't.

Besides his lodge, or hut, the beaver has his burrow, and there are some beavers which only use their burrows to live in, and do not make a hut at all. The European beaver is now, unfortunately, almost extinct, at least in civilised Europe, but where it does still exist it is not often known to practise house-building. It could hardly have done so in ancient times, since Pliny, the Roman naturalist, who describes its habits, says nothing about this one. He would have done so, we may be sure, had he known of its existence, and as he was a most eager inquirer, and beavers were common enough in Europe then, he could have had no difficulty in finding out all about them, even if he had not been able to study them for himself. The European beaver, therefore, is in the same state as those American beavers which do not make huts, but just as these latter are exceptional in America, so a few beavers here have been seen making huts, like the American ones. The habit, no doubt, has been gradually evolved, and may have begun by some beavers driving their passages so far through the bank in an upward direction, that at last they broke through the surface, and had to be covered in. It is a curious fact that man, in very early times, lived in caves, and after that made a sort of house underground — a burrow, in fact — so that his habitations may have gone through the same process of development as have those of the beavers — only with him it has been carried a little farther.

Beavers that do not build houses are called by the

French-Canadian trappers *paresseux,* or idlers. Such individuals do not make dams either, for they live by large and deep rivers, whose course it would be impossible for them to stem. In the banks of these rivers they make their burrows, and live a more or less solitary life. I have just stated my own views in regard to these primitive animals, but the Indians have another way of accounting for them, which has nothing to do with evolution or development. Their idea is that, after a certain time, the young beavers are expelled from the family lodge by their parents, who wish them to marry and have children. If, however, they fail to do this, their parents receive them back into the lodge again, but make them, as a punishment, do all the work of repairing the dam. On the following summer they are sent out again to marry, but if again unsuccessful in their wooing, they are not received a second time, but are expelled from the community, and become "outcast beavers." Thus, according to the Indians — and their story is, or was, confirmed by the trappers — there are both outcast beavers and slave-beavers. Ants, as we know, make slaves, and it would be curious if beavers, which so much resemble ants in their social habits, joined to their great architectural and engineering skill, were to imitate them, also, in this the most remarkable of their institutions. We cannot, with the example of ants before us, say that this is impossible; but no real evidence of it, as far as I know, has been adduced, unless we take the belief of the Indians as such; Indians, like other savages, are close observers of animals, but then, they have all sorts of wild legends and fairy-tales about them, as well.

But this fairy-tale of the slave-beavers — if we consider it as such — is told not only by the Indians, but by another and very different people who live far away from them, and whom they could never, in old times, have seen, unless, indeed, the Arabs discovered America. Six or seven hundred years ago, an Arabian author, named Kazwini, wrote a work called the *Wonders of Creation,* and in it he says, "The beaver (kundur) is a

land and water animal that is found in the smaller rivers of the country Isa. On the banks of these he builds a house, and in it he makes for himself an elevated place, in the form of a bench; then on the right hand, about a step lower, one for his wife, and, on the left, one for his young ones, and, on the lower part of the house, one for his servants. His dwelling possesses, in the lower part, an egress toward the water, and another higher one towards the land. If, therefore, an enemy comes on the water side, or the water rises, he escapes by the egress leading to the land; but if the enemy comes on the land side, by that which leads to the water. He nourishes himself on the flesh of fishes and the wood of the *chelendech* (? willow). The merchants of that country are able to distinguish the skins of the servants from those of the masters; the former hew the *chelendech* wood for their masters, drag it with their mouths, and break it in pieces with their foreheads, so that, in consequence of this office, the hair of the head falls out on the right and left side. The merchants, who are aware of this fact, recognise in the hair of the forehead, thus rubbed off, the skin of the servant. In the skin of the master this mark of recognition is wanting, as he employs himself with catching fish."

We do not quite know where the "country of Isa" lay, but beavers, at that time, were common not only in Europe, and the more northern parts of Asia — as Siberia — but southwards, in Asia Minor, as well, as far as to the river Euphrates. It is probably the beavers in these southern parts, which were nearest to his own country, that this Arabian writer was thinking of, and we see that he makes the animal build a house. The probability is that, over such a vast extent of country, the habits of beavers differed a good deal, as perhaps they do now, in the places where they still remain.

We have seen the beaver as a dam-maker and a house-builder, but we have not yet considered him as a maker of canals. In the construction of the dam and lodge, a great quantity of wood is required, and when the trees do not

grow very thickly, those on the edge of the pond are soon cut down and made use of, and gradually, as more and more fall, the beavers have to go farther and farther away from the water, in order to procure fresh timber. To transport this felled timber, overland, to the pond becomes a more and more laborious task, and at last an impossible one, many of the logs made use of being of great size, when compared with that of the beaver itself. To overcome this difficulty, the beaver sets to work and excavates a trench or cutting in the ground, about three feet wide and as many deep. Commencing it at the brink of the pond, he carries it on to the spot where the trees he covets are growing, and when these, in their turn, have been cut down, he lengthens it till it reaches others, and so on, following the trees as they gradually recede from the neighbourhood of the pond. Of course the water runs up into the channel thus excavated, so that now, when the beaver has cut up his logs, he has only to float them down the canal that he has so cleverly excavated. This he does by swimming with them in his mouth, or pushing them in front of him with his paws and nose; the water (though there is no current to help) offers very little resistance, and it is now quite an easy matter. Both the trappers and the Indians call these cuttings canals; and canals they are, it is obvious, just as much as those we make for barges to ply on. According to the size of the pond, and the scarcity or otherwise of the trees near its banks, will be the number of the canals made from it by the beavers. A pond figured in Mr. Morgan's book has five, at different points, all round it, and some might have a great many more. One that Mr. Morgan speaks of was close on six hundred feet, and there are some that are longer.

Beavers live together, not in large numbers, as used to be supposed, but two or three families in the same pond. Such ponds, however, continue to be inhabited by the descendants of such families, from generation to generation, and as the dams are always being repaired and extended by them, and the canals lengthened, they at last

become works of considerable magnitude. No one who first saw one of these great, ancient beaver-dams would suppose it to be the work of comparatively small animals, or, indeed, of any animal at all, except man. As for the canals, their banks soon become covered with moss and vegetation, so that they look like natural sluggish streams, oozing through the flat, marshy land. Mr. Morgan, speaking of them, says: "When I first came upon these canals, and found they were christened with this name, both by Indians and trappers, I doubted their artificial character, and supposed them referable to springs as their producing cause; but their form, location, and evident object showed conclusively that they were beaver excavations."

There is one other thing that the beavers make, besides their dams, their lodges, and their canals, and that is their meadows; but beaver-meadows, as they are called, are not the result of design on the part of the animal, but only the necessary consequence of its actions in other respects. Their appearance, and the way in which they are caused, are thus described by Mr. Morgan: "Where dams are constructed," he tells us, "the waters first destroy the timber within the area covered by the ponds. When the adjacent lands are low, they are occasionally overflowed after heavy rains, and are at all times saturated with water from the ponds. In course of time the trees within the area affected are totally destroyed; and in their place a rank, luxuriant grass springs up. A level meadow, in the strict and proper sense of the term, is thus formed; although much unlike the meadow of the cultivated farm. At a distance they appear to be level and smooth; but when you attempt to walk over them, they are found to be a series of hummocks, formed of earth and a mass of coarse roots of grass rising about a foot high, while around each of them there is a narrow strip of bare and sunken ground. The bare spaces, which are but a few inches wide, have the appearance of innumerable watercourses, and through them the water passes when the meadows are overflowed."

These meadows, though not designed by the beavers, are yet useful to them, for, as Mr. Morgan says: "In addition to the nutriment which the roots of these grasses afford to the beavers, the meadows themselves are clearings in the wilderness, by means of which the light as well as the heat of the sun is let in upon their lodges." Of course, when land that was once dry becomes overflowed with water, when peculiar-looking meadows appear, that were not there before, when canals wind about through them, and when trees that were formerly abundant grow thinner or even disappear, a considerable change takes place in the appearance of the country; and so numerous, till lately, were beavers in North America, that a very large extent of territory may be said to be the work, not, indeed, of their hands, but of their paws and teeth. Sometimes the Indians have been alarmed at the number of trees cut down by these animals, thinking they would not have sufficient fuel for their own encampments, but here, I think, they must have feared without cause, since beavers and trees have both been plentiful in the country from time immemorial.

On one occasion, however, by making a dam across a small stream running parallel with one of the principal railway lines of Canada, the beavers produced an accumulation of water against the railway embankment. As it was feared that the line might be flooded, or the earth supporting it weakened, with possible disastrous consequences, a cutting was made through the centre of the dam, thus lowering the water to its original level. The beavers, however, were accustomed to repairing their dams, and did so in this instance. The company again cut the dam, the beavers again repaired it, and this conflict between an animal and one of their chief commercial enterprises of the country continued, till the dam, having been fifteen times cut through, was at length abandoned by its architects. This shows, certainly, great perseverance on the part of the beavers, but it shows also that they are capable of learning by experience.

The beaver is the second largest animal of the order of rodents or gnawing animals, of which the most familiar

examples are the rat and the mouse, the first being the great capybara of South America, which creature weighs as much as ninety or even one hundred lbs. The beavers, when full grown, may weigh as much as fifty, but it is rare for one to attain this size. Though usually of a reddish brown, black beavers are sometimes met with, and white ones, though extremely rare, are not absolutely unknown. Traherne in his *Journey to the Northern Ocean* says: "In the course of twenty years' experience in the countries about Hudson's Bay, though I have travelled six hundred miles to the west of the sea-coast, I never saw but one white beaver-skin, and it had many reddish and brown hairs along the ridge of the back. The sides and the belly were of a glossy, silvery white." Prince Maximilian, too, who also travelled in North America, says that he "saw one beautifully spotted with white," and that "yellowish white and pure white ones are not unfrequently caught on the Yellowstone." This, however, was a long time ago. Not only white beavers, but brown ones too are getting rare now.

Beavers are nocturnal, so that it is not so easy to see them working at their dams and lodges as it might otherwise be. However, it would not be very easy, even if they worked in the day, for persecution has made them extremely shy and wary, and perhaps has even had something to do with their habits in this respect. On land the beaver is somewhat awkward, and not at all fast, so that, though he is able to gallop, an ordinary dog could soon run him down. The water is his more natural element, and here he is easy and graceful. His sight, at least in the daytime, is not very good, but his smell and his hearing are most acute. Upon the latter sense he relies so much that he will often choose out some little hillock or rising piece of ground, where he will sit up on his hind legs like a sentinel, listening attentively. Then, says Mr. Morgan, his best biographer, "he will retire, but only to return at intervals, and repeat the observation until satisfied whether or not danger is near." With this interesting trait we will take our leave of this most interesting and badly treated animal.

THE MOOSE.

BY

P. St. Michael Podmore, M. A.

DURING my explorations in Muskoka and the north, I have had a good opportunity of studying the moose while living in its natural haunts. The name "moose" is derived from "moosa," an Indian word meaning wood-eater. The animal is so called because its food consists chiefly of twigs and the bark of young trees, rather than herbs and grasses: its short neck renders grazing difficult, and is rarely resorted to.

Moose are distinctly forest-loving animals, and live only in wooded countries where the winters are long and severe. They have always been less numerous in the west than in the extreme east, where the forest and lakes are singularly well fitted to their habits, and it is there that they are still hunted with the most success.

The fall, or autumn, is the best time of the year to hunt the moose. The weather at this season is bright, clear, and bracing; I doubt if any climate can compare with the district of the Canadian lakes during September. From September 20th to October 20th is the season for moose-calling, and the full of the moon is the best time, as the bulls seldom come up to call before sunset. The most successful hour is between sundown and dark. Moose are very pugnacious in this season, and fight desperately. During the summer of 1889 I discovered the skeletons of two bulls with their huge antlers locked in death. Only once did I catch a glimpse of a fight between two bull moose, and the following is a quotation from my remarks upon the subject:—

"An analogy we may find among the huge boulders on

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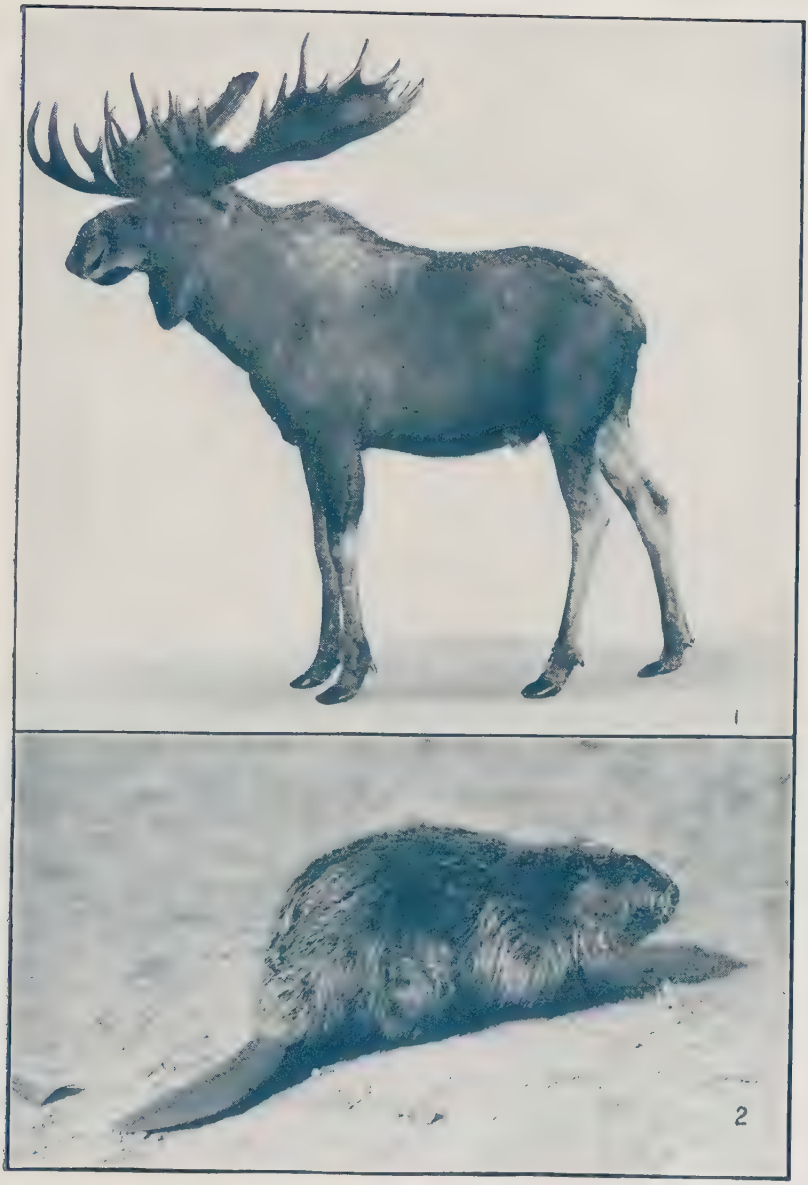
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1.—Moose. Belongs to the Deer family and is the largest of its living members. It feeds chiefly on the tops of low plants and leaves of trees.

2.—The American Beaver. The Latin name is Castor. Hats were made from the fur of the Beaver and a man's top hat is to-day spoken of as a Castor in England.

yonder hills, that surround an inland lake some three miles distant. There, with antlers locked and united for ever, are two huge bull moose. The first challenge came from this very bay. It was answered: the voice was madly pursued, until confronting him in this desolate spot stood the king of the forest, eager for the fray.

" They fought with equal madness. The shock of their charge seemed to vibrate through the forest: from their lips fell a foam, and from their eyes darted forth red streams of fire. Their thick, massive shoulders hardly quivered when the flesh was gored and torn. The breath came from their broad nostrils like steam escaping from a vent. Such a combat could not last. How well matched they are! It is difficult to accede to the one or the other an advantage of one ounce of weight or an inch of height.

" See! they have broken loose from that last, long contact, and each has withdrawn as though the laurels of victory cannot be won. They stand panting and waiting, each expectant of the other. It is for the last charge. How noble they look even in their ferocity, gathering up those strong muscles, with head erect to bellow forth those terrible sounds that can be heard for miles!

" The dust and decayed vegetable matter whirl once more in a dense cloud, and those savage warriors have charged for the last time. They strain, force, and dash each other viciously forward; wounds gape wider, blood spouts afresh in crimson trickles; their narrow sides swell as though bursting under that tremendous effort. Now they tremble, they totter, they sway, they fall! They can rise no more! Their antlers are locked, and cannot be freed! Thus they must starve, or become a prey to the ever-watchful wolf! "

Mr. Long gives an outline of an encounter between two bull moose that may be compared with my own experience, both with reference to the locality where these fights take place and the struggle itself.

" Far up on the mountain-side the sharp, challenging grunt of a master bull broke out of the startled woods in one of the lulls of our exciting play. Simms heard, and

turned in the bow to whisper excitedly: ' 'Nother bull! Fetch-um ol' Dev'l this time, sartin.' Raising his horn, he gave the long, rolling bellow of a cow moose. A fiercer trumpet-call from the mountain-side answered; then the sound was lost in the crash, the crash of the first two bulls, as they broke out upon the shore on opposite sides of the canoe.

" We gave little heed now to the nearer play; our whole attention was fixed on a hoarse, grunting roar — uh, uh, uh! erryuh! r-r-r-runk-unk! — with a rattling, snapping crash of underbrush for an accompaniment. The young bull heard it, listened for a moment, like a great black statue under the moonlight, then he glided away into the shadows under the bank.

" The larger bull heard it and came swinging along the shore, hurling a savage challenge back on the echoing woods at every stride.

" There was an ominous silence up on the ridge where a moment before all was fierce commotion. Simms was silent too; the uproar had been appalling (*vide* ' with head erect to bellow forth those terrible sounds '), with the sleeping lake below us, and the vast forest, where silence dwells at home, stretching up and away on every hand to the sky line. But the spirit of mischief was tingling all over me as I seized the horn and gave the low, appealing grunt that a cow would have uttered under the same circumstances. Like a shot the answer was hurled back, and down came the great bull — smash, crack, r-r-runk! till he burst like a tempest out on the open shore, where the second bull with a challenging roar leaped to meet him.

" Simms was begging me to shoot, shoot, telling me excitedly that ' Ol' Dev'l,' as he called him, would be more dangerous now than ever, if I let him get away; but I only drove the canoe in closer to the splashing, grunting uproar among the shadows under the bank.

" There was a terrific duel underway when I swung the canoe alongside a moment later. The bulls crashed together with a shock to break their heads. Mud and

water flew over them (*vide* the dust and decayed vegetable matter whirl once more in a dense cloud); their great antlers clashed and rang like metal blades, as they pushed and tugged, grunting like demons in the fierce struggle. But the contest was too one-sided to last long. Ol' Dev'l had smashed down from the mountain-side in a frightful rage, and with a power that nothing could resist. With a quick lunge he locked antlers in the grip he wanted; a twist of his massive neck and shoulders forcing the opposing head aside, and a mighty spring of his crouching haunches finished the work. The second bull went over with a plunge like a bolt-struck pine. As he rolled up to his feet again the savage old bull jumped for him, and drove the brown antlers into his flanks. The next moment both bulls had crashed away into the woods, one swinging off in giant strides through the cracking under-brush for his life, the other close behind, charging like a battering-ram into his enemy's rear, grunting like a huge wild boar in his rage and exultation. So the chase vanished over the ridge into the valley beyond; and silence stole back, like a Chinese empress, into her disturbed dominions."

A deer when started by a hunter, or driven by hounds, usually returns in a few days to the hill or mountain-side where he was first found; but a moose when thoroughly alarmed will start on a long, swinging walk, and, taking with him his entire family, leave for good. Moose-signs are unmistakable, and the marks where they have yarded show for years. The moose, while totally lacking the grace and ease of the movement of the deer, is appallingly grand as he stands swinging his immense antlers like feathers as he turns to catch a taint in the breeze. In the rutting season, when they are at their best, the body is rusty-black, and the legs grayish. The shoulders and broad chest show tremendous strength, and the hips are stout and clean-cut; but the great height of a moose is owing chiefly to his long legs and bristly mane. The nostrils in repose are in a collapsed state. The ears come above the horns, not behind, as is usually the case in

mounted specimens. In the living animal the nose is a marvel of ugliness, and the surface covered by the olfactory nerves so great that it is doubtful whether there is any other animal whose sense of smell is so highly developed. Like most denizens of the forest, the moose relies far more on its scent than on its sight. The eyes are small and wicked, snapping and gleaming on the slightest provocation, and betray at once the ugly character of their owner. When captured young, moose prove most interesting pets, and become very tame. A gentleman in Toronto succeeded in training a pair of moose to drive as a team, and the distance they covered in a short space was something remarkable. In confinement they are dangerous from a trick they have of striking with their forefeet, not straight out as a horse sometimes strikes, but first lifting the hoof almost perpendicularly above their head and then cutting forward and down, a blow that would tear a man nearly in two. A large bull generally weighs one thousand pounds, and sometimes they reach from twelve hundred to fifteen hundred pounds.

The moose is a local race of the elk of Northern Europe. Unlike other animals that live in these Northern temperatures it does not change its coat in winter to blend with Nature's garb as do the caribou, Virginian deer, etc.

Mr. J. Rowan thus describes the introduction to a battle between two bull moose:—

"I was calling in a little barren or open space in the woods, and during a quarter of an hour of breathless suspense I could hear two bulls advancing toward me from different directions, and both so near that it was a toss-up which would come first. At last one fellow came out into the open, and stood defiantly awaiting the approach of his rival, whom he could plainly hear rampaging through the neighboring thicket." On another occasion he writes: "A wounded bull charged me repeatedly, in a most determined but rather blundering way. Fortunately I was in the woods, and had no difficulty in avoiding his attacks by dodging round the trees. Had it been in the open, I might not have fared so well."

The call of a cow, which the hunter imitates through a horn or trumpet made of birch-bark, is a series of grunts or groans winding up with a prolonged, dismal, and rather unearthly roar, which in calm weather can be distinctly heard at a distance of two or three miles. One peculiarity of the moose is that for a great distance he can go straight to the spot from whence the call proceeds, even after a considerable time has elapsed, and without a repetition of the sound to guide him; and hunters, after failing in their call during the previous evening, have known a moose come straight to the place on the following morning. It is considered best to call from a canoe, as many moose are lost by crossing the hunter's tracks. They walk at the rate of four miles an hour, even in woods so thick that it is hard to understand how they get their horns through. They carry their heads high, noses well up, and horns thrown back. The horns have been known to measure six feet. In July these horns are soft, but in August they rub off the velvet against the bushes, and in September they are in full bloom. The cows have generally two calves in the month of May, which remain with their mothers for one year and then go off on their own account.

The moose is about the size of a large horse. The head is very large; snout and ears, long; neck, short, with a thick mane. Horns spreading into a broad palm; tail, short; the color is blackish-grey. The teeth are white; horns brownish-yellow, the extremities of the prongs becoming yellowish-white. The eyes are black; nose, forehead, and upper lip, yellowish-fawn; inner surface of the ears, yellowish-white; outer surface, grayish-brown. Sides of head, yellowish-brown. Hairs on the appendage under the throat, black; lower lip and chin, dark gray, formed of a mixture of black and white hairs.

Major Smith, who was a close observer and naturalist of considerable attainments, says:—

"For us, who have the opportunity of receiving the animal in all the glory of his full-grown horns, amid the scenery of his own wilderness, no animal could appear

more majestic or more imposing. It is, however, the aggregate of his appearance which produces this effect: for when the proportions of its structure are considered in detail, they certainly will seem destitute of that harmony of parts which in the imagination produces the feeling of beauty. *The Quadrupeds of North America* (Audubon and Buchman) contains the following: ' They feed on the water-plants, or browse upon the trees fringing the shores. In the winter they retire to the dry mountain ridges, and generally " yard," as it is termed, on the side facing the south, where there are abundance of maple and other hardwood trees upon which to feed, either by browsing on the tender twigs or peeling off the bark from the stems of such as are only 3 or 4 inches in diameter.' "

Although moose swim well, they are not known to dive; they swim with the head and part of the neck above water, like cattle. When pursued in boats they frequently attempt to upset them, and at times open their mouths and make a loud snorting noise, striking at the same time with their forefeet, and occasionally sink the canoes of the Indians or hunters. Upon one occasion, a young man going fishing, and having his fowling-piece, on turning a point of the lake, saw a large moose in the water and fired at it with shot, tickling it severely. The moose at once made for the canoe; and whilst the alarmed fisherman was attempting to escape, his boat became entangled in the branches of a fallen tree, when he was forced to give up the canoe and get away as he best could; the animal on reaching the boat completely demol-

NOTE.— A "yard" is not, as some people seem to suppose, a trampled-down space, with definite limits; the yard is merely the spot which a moose has chosen for its winter home, because it contains plenty of browse in the shape of young trees and saplings, and perhaps also because it is sheltered to some extent from the fiercest winds and heaviest snow-drifts. The animal travels across this space in straight lines and irregular circles after food, treading in its own footsteps where practicable. As the snow deepens these lines of travel become beaten paths. If the snow is very light, moose do not yard at all; but in a hard winter they begin to yard in December.

ished it. Unfortunately the females are sometimes killed when they are with calf. They do not generally make any noise in the woods, unless when provoked, but in captivity they utter a plaintive sound. . . .

Mr. Frederic Irland writes:—

"The camp was on the Crooked Deadwater by the side of a beautiful stream at the head of a great river. Just across the narrow waterway one of the grandest mountains in New Brunswick rises sheer and dark, a great pyramid of eternal verdure, which in the winter is the feeding-ground of hundreds of moose. It was into this inviting camp that we stumbled long after dark, scaring a little moose out of the small clearing, not 200 ft. from the cabin door. The frost came down and cracked the trees that night till they popped with the cold, and the sound was like a skirmish of rifles. The next morning when we awoke there was a thin glaze on the snow, and when we walked abroad it was like treading on innumerable panes of crackling window-glass. We heard three different moose get up and run when we were a quarter of a mile off. . . . We climbed the mountain for an hour. Then we came to the tracks of two moose, fresh that very morning. The footprints were not extra large, but the broken twigs on two trees showed where a pair of antlers had scraped on either side, and I could scarcely touch the two trees at one time with my outstretched hands. Moose with big horns do not always have large hoofs.

"'They lie down about this time in the morning,' said my guide, . . . and after a while, over the top of a fallen tree-trunk, I saw the mane of a great, black animal. The old fellow had not seen us yet. He swings his great horns just a little, the steam rises from his broad nostrils. Lazily he winks his eye. I can see every hair upon his back. Carefully I push the camera above the prostrate tree-trunk, first brushing the snow away with my hand. Tick, goes the shutter and the great beast is getting up. The antlers swing, he rises two feet at a time, like an ox, hesitates an instant, as a moose always does,

shows the little symptoms of fright so familiar to those who know the habits of the moose, and then goes down the mountains like a runaway locomotive."

Mr. Irland's remarks about the frost attacking the trees recalls one of my own experiences in 1890. The sun was still shining in the skies, though the wind had become very cold and penetrating. Occasionally, as the temperature fell lower and lower, there would sound from the depths of the wood a startling noise, like the crack of a rifle, and I felt my heart throb tumultuously with excitement. As evening approached these cracks became louder and more frequent, until a roar, as of artillery, echoed through the forest. These tremendous noises resulted from the frost attacking the giant trees.

"The broad valley and mountain banks of the Klondike," writes Tappan Adney, "are an admirable feeding-ground for the moose. The temperature in winter is exceedingly cold and crisp, but the snow-fall is light, and by reason of the intense cold the snow does not settle or pack. There is so little wind, especially through the early part of the winter, that the snow accumulates on the trees in strange and often fantastic masses, giving the landscape, especially on the mountain-tops, the appearance of having been chiselled out of pure white marble. On account of its lightness, the snow is no impediment to the long-legged gaunt moose, which is not obliged to 'yard' as in more southern deep-snow regions, but wanders at will from valley to mountain-top in search of the tender twigs of willow, white birch, and cotton-wood. The Indians surround the moose in its feeding-grounds, and as it runs, one or more of them is tolerably sure of a quick shot."

The moose in this neighborhood has long been the main support of the Indians, and in their household economy no portion of the beast is wasted. To quote further:—

"The hides were brought indoors, the hair was shaved off, and all the sinew and meat adhering were removed by means of the sort of chisel made of the moose's shinbone. The skin was now washed in a pan of hot water.

The tanning of the hide by the squaws is done the next summer. The various portions of the moose were divided among the village. One family got the head, another a slab of ribs, another the fore-shoulders. The shin-bones were roasted and cracked for their marrow; the ears, though nothing but cartilage, were roasted and chewed up; the rubber-like muffle, or nose, and every particle of flesh, fat, or gristle that could be scraped from head to hoofs, were disposed of. Even the stomach was emptied of its contents, boiled, and eaten."

Though I have included the moose among the big game of Muskoka, having frequently come into personal contact with it, yet I should consider that the State of Maine was "the sporting paradise" for moose. . . .

THE VIRGINIAN DEER.

BY

P. St. Michael Podmore, M. A.

PERHAPS no species of wild animal inhabiting Muskoka deserves to be regarded with more interest than the subject of our present chapter, the common or Virginian deer; its symmetrical form, graceful bound, and rushing speed, when flying before the hounds, excites the admiration of every one, though he be ever so dull an observer.

The skin is of the greatest service to the wild man, and also useful to the dweller in towns; dressed and smoked by the squaw until soft and pliable it will not shrink with all the wetting to which it is exposed. While crossing Lake Muskoka during the spring of 1889 my canoe struck against a floating log and rapidly commenced to fill. It was night — the shores and islands were invisible — soon

From "A Sporting Paradise." New York. F. A. Stokes Company, 1904.

I found myself swimming for my life. The general tendency is to swim in circles, but some strange luck brought me safely to an island after being in the water about an hour. Covering the hot sand over my damp clothing I soon fell asleep. My deerskin moccasins were as soft and pliable next day as though they had been soaked in oil.

The skin of the Virginian deer makes an excellent hunting shirt and leggings, and it is the material part of the dress of many Indian tribes. Although the animal scarcely ever occupies the same bed on successive nights, it is usually found in the same range, or drive, as it is called, and often not fifty yards from the place where it was startled before. It is fond of lingering round fences and old fields that are partially overspread with brushwood, briar patches, and other cover to screen it from observation. Occasionally it lies immersed in water, the nose and antlers alone being visible. Does and bucks are fattest from November to January. The young are produced in the month of April. The doe conceals her young under a prostrate tree-top or in a thick covert of grass, visiting them occasionally during the day, especially in the morning, evening and at night. The young fawns when only a few days old are often found in so sound a sleep that on several occasions they have been taken up in the arms before they became conscious that they were captives. On one occasion I discovered a young fawn sleeping under some bushy boughs. Alighting from my horse, I lifted the pretty creature in my arms and quickly mounted. Scarcely had I done so before I heard the sound of some heavy animal following in my tracks. It was a large doe, and as she approached nearer I observed her movements were fearless and extraordinary. Proceeding at a rapid pace, she lifted high her front legs, performing a curious striking action in the air. Soon I discovered her object — she was the mother in pursuit of her young. Wishing to test her fidelity, I urged my Indian pony to a gallop, but I had not covered more than half a mile when I became aware that

the pursuer was close at hand and meant mischief. The idea of danger from a deer appeared absurd, so I seized my revolver and drew in rein. Pointing at the deer's breast I fired. The bullet missed, and I escaped by a miracle receiving a blow that would have maimed me for life. The sharp hoof struck my saddle and cut it as cleanly as a knife. This was enough, so I threw my burden upon the ground. The mother, however, was not satisfied, but pursued me for a considerable distance before she returned to her offspring.

The Virginian deer when taken young easily becomes domesticated, and will attach itself to its keeper in a few hours. Some have been reared successfully by a she goat or cow. They breed in confinement but become troublesome pets — they have been known to bite the heads off chickens and ducks, devour harness, and jump through windows into the house. One to four fawns are the number of the young. At Goose Creek, Mr. Audubon killed a doe with four fawns. The deer when wounded will bleat loudly like a calf, and the buck emits at night a shrill whistling sound. This deer cannot exist without water, and is obliged to visit some stream or spring every night. It is nocturnal in its habits; when first startled, without being much alarmed, it gives two or three springs, alighting with apparent awkwardness on three feet, and immediately afterward resting on the opposite side, erecting its white tail and throwing it from side to side. A few high bounds succeed, whilst the head is turned in every direction to enable the animal to detect the cause of alarm. The leaps and high boundings of this deer are so graceful that they cannot be witnessed without admiration. In riding through woods at night I have often heard them stamp their feet, the bucks on such occasions giving a loud snort, then bounding off for a few yards, and again repeating the stamping and snorting, which appear to be nocturnal habits. Deer have been known to plunge into the surf, and swim out to sea for a mile or two when heavily pressed.

The tender, juicy, savoury, and, above all, digestible

qualities of the flesh of the Virginian deer are well known; and the venison is held in highest esteem from the camp of the backwoodsman to the luxurious tables of the opulent, and, when not kept too long, a fat haunch with jelly is almost as much relished as a "hunter's steak" cooked in the open air on a frosty evening far away in the dark recesses of the forest. The weight of this deer has rarely exceeded two hundred pounds.

On meeting with other males, the weaker animal has been known to be gored to death; generally, however, he flies from the vanquisher, or follows him, crestfallen, at a respectful distance, ready to turn on his heels and scamper off at the first threat of his victorious rival. In these *rencontres* the horns of the combatants sometimes become interlocked in such a manner that they cannot be separated, and the pugnacious bucks are consigned to a lingering death by starvation.

The following is an extract from my notes:—

"Crane Lake, Muskoka, September 7th, 1902. Leaving Blackstone Lake we took a path through the bush. After walking about a mile we arrived at Crane Lake. The only event during our journey which produced excitement occurred while we were cautiously crossing a swamp on the half-decayed, slippery logs. Mac was carrying a number of articles, but stepping out in splendid form as though he had been born to bush-life. His object appeared to impress the party that an athlete was equally at home in all the departments of courage and endurance. He was walking some distance ahead of the party when suddenly he disappeared. We heard, however, he was much alive; in fact, he made his existence conspicuous for miles around by his emphatic and uncompromising condemnation of the log he had slipped off. We were all inclined to smile when he showed his face covered with black mud, giving him the appearance of a nigger, but when he groaned out that the whisky flask had fallen out of his fur-coat the whole party made a rush for the mud and dirty water.

"When we arrived at Crane Lake we found four boats

in readiness to convey us with the Indians and hounds to the happy hunting-ground. The picture presented by these hardy men clothed in their rough shirts, gaiters, and boots, with rifles and camping-kit, will not easily be forgotten. The sun was shining brightly, and on either side, so far as the eye could reach, stretched the bright green tops of the forest growth, extending to unexplored regions of dense woods, still the natural possession of bears, wolves, racoons, lynx, etc., and innumerable deer. The lake water was sparkling and clear, and the little islands with their luxuriant vegetation and romantic rocks and bays gave a perfect tone to a beautiful scene. Crane Lake and Deer Lake are still uninhabited by settlers. No rough shanties or blackened clearings deface their loveliness. Here is an ideal camping-ground, and one can picture the pioneer cutting out for himself a rude home and living. The mind tries to imagine the conditions during the cold bright days of winter — the snow-clad earth and ice-bound water. A sportsman of some refinement and artistic taste can hardly resist the temptation to put in his claim for the one hundred and forty acres and dwell here forever. We must remember, however, in our enthusiasm that lovely scenery requires the observer to be fortified with materials necessary for existence. The impression conveyed to my mind was associated with personal comforts, *viz.*, modern clothing, modern guns, provisions, etc., guides and servants, and a college friend — food for the body, and food for the mind; but where everything must be done by one's own efforts, trees cut down, a house built, wood chopped, fires lit, food produced and cooked, etc., common sense disabuses the mind. . .

"My position was close to the lake. It was a fairly open spot where tall trees had long ago rotted and fallen. This swamp covered about ten acres, and on the north side the ground rose to a considerable height. The place was bounded by a few tall, handsome trees, and it was behind one of these on the south side that I took my stand about thirty-five yards from the thick bush.

"My companions soon disappeared and I was left

alone in perhaps one of the wildest and most solitary regions in the world. For ten minutes a deathly silence reigned, and my thoughts dwelt upon my line of action in the event of a deer crossing the swamp. My duty was to drive him back to the guns and prevent him taking to the lake. The first awakening to life was the squall of some blue-jays evidently startled by the hunting-party, and I had opportunities of observing their habits closely from my hiding-place. They approached so near to me that I could have hit them with a stone, and then, as though disgusted, they all flew off chattering. Then a large handsome kingfisher about the size of a pigeon, crossed and recrossed the swamp, giving me an easy shot and a desire to add his gorgeous plumage to my collection of birds. The presence of this bird appeared to create some stir and animation in the dark waters of the swamp.

Innumerable heads popped up, and now and then a heavy splash startled me. Suddenly there arose a hideous bellowing, started by a deep guttural voice and chorused by thousands, until I realised the fact that a deer might pass me during the din. They were huge bull-frogs, but what the bird had done to cause their wrath or alarm I could not conceive, until it occurred to me that they had only just recovered from the noise of our party. Bull-frogs are considered excellent eating. Both Mac and I pretended we liked frogs' legs, both even deceived each other by boasting we had often eaten them, both became most enthusiastic over the cooking, but drew a sigh of relief when we perceived the skinning and killing process had already been attended to. Then came the new odor of frying. Mac smacked his lips and whispered in my ear: 'I wish they had come sooner, old man! I could eat the lot myself'—but oh! with what a sickly smile he spoke, and when he looked at me he perceived a sicklier face. Then he frowned and looked as though he would say: 'I question if he has ever eaten a frog's leg in his life.' Complaining that the smoke got into his throat, and with a cheery request to the Americans that he did not care how soon the frogs were cooked, he sat

down by my side in silence. Suddenly he turned to me and whispered: 'Do you like frog's legs, Poddy?'

"'Yes,' I replied, feeling uncomfortable as a sort of fishy, fowly odor entered my nostrils. 'You don't seem very keen,' he added. After this we fell into silence, to be aroused by a jolly American bearing in triumph toward us a crowded pan of the nauseous-looking fry. How I wished inwardly he would fall and sprain his ankle, and I thought I heard a remark from Mac not too complimentary; but it may have been only fancy, as the leaves were rustling in the trees overhead. Mac was helped first, and for this I was devoutly thankful. I made an excuse that my plate was dirty, thus causing delay while I washed it in the lake, but I found Mac waiting for me patiently upon my return with his piled-up plate untouched. Probably he would have sat for an hour had not a voice whispered: 'How do you like them?' He replied with the question: 'Have you tasted them yet?' I told him I was waiting to hear whether they were properly cooked. Seizing a small leg he commenced to eat, murmuring: 'Most delicate! most delicious!' and suggesting again and again how valuable they would prove for invalids. He, however, did not ask for more, and soon disappeared *hors de combat.* We don't eat frog's legs now, nor refer to the subject.

"Scarcely had the frogs disappeared when I heard the approach of the hounds, their deep baying sounded almost sepulchral from the virgin forest.

"Immediately I became alert, examining gun, cartridges, safety-catch, etc., and then listening intently. I gazed on all the deer-runs without making the slightest movement with my body. Once or twice I caught the sound of snapping twigs, but after waiting anxiously for half an hour I concluded that the stag had 'broken away.' Another monotonous silence followed, and I had a temptation to fire at a woodcock that sat upon a bough close by uttering his strange rattling notes. After a while I could not resist the temptation to leave my post and approach him. I had walked only ten yards, when I was

aroused by a deep baying, and before I could regain my tree there came a whirr and a report as a bullet went whizzing through the air. Some sportsmen who have had no big-game experience completely lose their heads when confronted by a wild stag. They are unable to shoot or move. This is called the ' deer scare.' I had experienced this feeling ten years before, and had no longer a tendency to it. My plan was to remain concealed, and then rush forward and discharge both barrels.

" I had not long to wait — a brief notice of snapping twigs, and then a huge stag appeared with his head almost touching the ground, and his handsome antlers directed toward me. In a second I fired, and the stag took a bound into the air, but before I could reach him he sprang to his feet and bounded off toward the north. I shot again, but as I did so either his wound or the slippery condition of the log caused him to stumble upon his knees. I aimed between the shoulders, and his tail taking the line of sight was cut off as cleanly as though it had been severed with a knife. This incident is unique in my knowledge of deer-shooting experience. The tail is still in my possession. I found eventually that all my shots took effect. My attention was soon directed again to my post, as the noise of a heavy animal approaching drew near."

The white man conducts his hunting excursions in various modes suited to his taste and adapted to the nature of the country in which he resides. My favourite method used to be " deer-stalking." This is carried out on foot, without dogs or companions. Experience soon teaches us where to look for deer. He may be espied in his bed, or silently crept upon from behind the cover of a large tree whilst he is feeding. The prints upon the snow or path are sure indications to guide the sportsman. When studied closely a reliable estimate may be formed as to the time and pace that the deer has crossed the path. It would be impossible to write directions to would-be big-game hunters, natural instinct becomes our only teacher, and living in Muskoka's pure atmosphere the

senses of sight and sound wonderfully improve. A knowledge of the movements of a deer when alarmed, when at ease, or when satisfied his pursuer has departed, are essential to successful deer-stalking.

SOME CURIOUS ANIMALS OF SOUTH AMERICA.

Alpacas — Chinchillas — Sea-Lions.

BY

Arthur H. Beavan.

MANY years ago there walked into a Liverpool broker's office a quiet, shrewd-looking individual, who asked for a sample of some strange kind of wool he had seen in one of the dock-warehouses. The head clerk stared; such a request had not been made for years, but, recovering his presence of mind, he took down from a shelf a dust-covered roll of blue paper and gave it to the stranger, who departed.

A month later, the mysterious customer reappeared, and this time asked to see one of the principals, neither of whom happened to be in, as there was little business to attend to, things being bad on 'Change, and there were many more sellers than buyers. A clerk hurried off to fetch the head of the firm, and when on his arrival the stranger gravely asked him what price he would take for the entire lot of wool (fifty odd bales) he was astonished, for the consignment from South America had been eating its head off in rent for months past — no one would even look at it, much less make a bid.

Impulsively the head of the firm quoted sixpence a pound, less ten per cent. for cash, and the buyer, quietly filling up a check on account, instructed him where to deliver the bales, and left without divulging what he intended to do with them.

From "Animals I Have Known." F. A. Stokes Company, New York.

The office became a scene of wild excitement, and to celebrate so utterly unexpected a sale, a holiday was given all round.

The stranger's name was Salt (afterward Sir Titus Salt), and his queer purchase was alpaca-wool, the merits of which as a textile he was the first to discover, and thereby made his fortune. . . .

On the plateaux of the Chilian and Peruvian Andes — often veiled in clouds eleven thousand feet above the sea-level — llamas and alpacas (the South American "ships of the desert"), from time immemorial — long before the Spaniards came there — were jealously guarded by the natives, llamas as beasts of burden, and both llamas and alpacas for their flesh and wool.

The conquerors of Peru called llamas *sheep,* describing them more accurately as resembling *camels without humps.* But their graceful heads, big ears, and prominent eyes at once recall the kangaroo, while their feet have only two springy toes, completely divided, and padded underneath, each shod with a hoof hooked downwards, and as admirably adapted for mountaineering as is the elastic pad of the camel for treading the yielding sands of the desert.

Like sheep, the domesticated llamas are herded at night to protect them from beasts of prey, and at sunrise are turned out to graze, led by the fathers of the flock.

The wild llamas and alpacas love the almost inaccessible heights, whence can be had the most superb views all along the backbone of the Andes range, tiers upon tiers of snowy peaks stretching in every direction; on the west, the Pacific Ocean, on the southeast, the boundless Argentine pampas. But the llamas and alpacas care for none of these things, their only concern being to find good pasturage.

Similar to the llama and alpaca, but much smaller, being about the size of a big sheep, is the vicuna, with its beautiful rich fleece. In regions of perpetual snow it flourishes, but perishes on the warm plains. When hunted, the least thing suffices to throw it into a state of

wild terror, so that at a big drive it is forced, if possible, into defiles, across which cords with many coloured rags attached have been tightly stretched, and the fluttering of these in the wind completely paralyses the vicuna.

The fourth of the llama species is the wild huanaco, or guanaco, of Patagonia, whose yellowish fur is often used for carriage-rugs.

Patagonian Indians relentlessly hunt these animals down on horseback. When within reach they secure them with the bolás — long lines with balls at each end — which they dexterously throw, and thereby entangle the animals' legs.

Guanacos have been described as having the head of a camel, the body of a sheep, the feet of a deer, the neigh of a horse, and the speed of the race horse.

All the tribe are difficult to stalk on the open plain, owing to their acute powers of hearing and seeing, and their alert watchfulness; there being always one or more sentinels on the "look-out."

One thing I would impress upon visitors to a zoological garden. Never approach too near the gentle-looking creatures in the llama enclosure. Without the slightest warning, if they have been previously annoyed, or if they take a dislike to your attire or your personal appearance, they are likely, being ruminants, to bring up from their false stomachs portions of half-digested fodder, and, with fatal precision, eject the vile-smelling stuff into your face.

Chinchillas.— Dame Fashion for a time consigned chinchilla-furs into the background, but now has reinstated them, which is wise of her, for they suit almost every complexion, brunettes especially, reflecting their own softness upon the wearer's face. The best are light silver-grey in the centre, and cost almost as much as a Russian sable. London imported 23,300 of the real and scarce skins from Peru and Bolivia, and 122,500 of the bastard from La Plata in 1903.

Whence come the animals to whom we are indebted for these furs? That they must be small we know, for

each cloak consists of many skins. So fine is the hair that one would imagine chinchillas came from a warm country. As a matter of fact, these little animals are about the size of large rats. Many years ago a traveller funnily described them as resembling woolly field-mice that lived underground and fed on wild onions; they live high up in the Chilian and Peruvian mountains, nearly within reach of the snow-line, burrowing closely together like rabbits, and are so prolific, that two litters of four young ones each are produced each year. They need to multiply and increase in order to make up for the drain upon their numbers, thousands being exported and thousands being hunted down by muzzled dogs (so as not to injure their delicate fur) or caught in traps by the natives living within reach of their haunts.

When I was on the west coast of South America, bundles of chinchilla-skins were frequently offered to me for sale by ragged Peruvian youths. Absurdly small prices were asked, but they invariably turned out to be damaged, or badly preserved (those rejected by regular hunters), or they were pelts of the lagotis — a little animal resembling the chinchilla — which, although soft, have not the same uniform shade, and can be readily distinguished by experts.

Like most of the "leaper" family — jerboas, squirrels, and Cape hares — chinchillas stand upon their hind legs, and feed with their fore-paws in a charming manner. Their food is dried grass, seeds, and bulbous plants, which they grub up from soft soil, for their delicate fore-limbs, shorter than their hind ones, have not much strength.

To my thinking, no animals are more pleasing to look at than these little fellows as they frisk and play about, pretending to chase one another, then stopping short to listen attentively, before nibbling a bit here and there after the manner of squirrels. They have widely-spread ears, a brush-shaped tail, pretty head, the upper lip adorned with long, cat-like whiskers or feelers, expressive eyes, and symmetrically-rounded bodies.

Easily tamed, they make charming pets, and are so gentle in disposition that they can be safely handled and fondled. In Chili they are kept, like cats, in the houses, seem contented with their lot, and instinctively learn good manners.

I once visited the small cat-house at the Zoo some weeks after a litter of baby chinchillas had come into the world, and I induced the keeper to let me see them. The interesting family was in a special compartment behind the scenes, and in a box, snugly provided with wool and hay, was the mother and three tiny counterparts of herself.

I asked permission to handle them, and I took them carefully up, the mother making no protest, but looking up at both of us with a human expression of anxiety, blended with trustfulness, that I shall never forget.

Sea-lions.— The sea-lions of the south (the coasts of Peru, Chili, and Patagonia) represent the walruses of the frozen north, nearly equalling them in size, but are without tusks.

I came to know a lot about sea-lions when on the islets adjoining the Chinchas, off the coast of Peru.

Among the British vessels at the Chinchas off the North Island was the *Mindanao.* Its captain and I became great friends, attracted by our common liking for natural history, and I was delighted when he suggested getting up a picnic of congenial souls to explore the Ballistas, an uninhabited group of islands visible from the Chinchas.

We borrowed a roomy whale-boat fitted with two masts, took with us sufficient food for several meals (turkeys, good and cheap, being the principal item), and, well supplied with guns and ammunition, we sailed away — a party of six — early one lovely morning, with a steady but moderate fair wind and smooth sea, the ideal of yachting weather.

No guano deposits of mercantile value have ever existed on this rocky group. The sea-lions and seals leave few fish for the birds, without which there can be no accumulation of deposit.

While we were there seal-life was abundant, and the young ones were almost fully grown. We thoroughly explored the rugged coast of the first islet we came to, and on an isolated rock discovered a sea-leopard (the leopardine seal), a large animal, with long, tapering neck, very small head (pale grey above, yellowish below), and its back spotted with white, like the pard.

Before we could get near him he heard us, quietly rolled himself into the sea, disappeared, and came up a long way off. On the weather-side of the largest island we came to the mouth of a great cave, inaccessible from the land, and could see its shelving beach running far into the cliffs, where hundreds of sea-lions, young and old, reposed in fancied security, for they were seldom disturbed, the steady trade-wind habitually raising too much sea to admit of landing, although one of our party, who had been to the Ballistas before, told us that he had contrived to land with a few men, but the sea-lions in their hurry to get into the water charged in a body, knocked them all down, and severely hurt one of them. The lions had evidently chosen their place of retreat with great judgment.

We got as near as we dared and fired a salute into the air. Such a commotion ensued! The herd, tumbling over each other, shuffled into the sea, breasting the big waves that broke upon the beach. Then they made straight out to the offing, several huge fellows passing within a yard or two of our boat, and we had a good look at them.

Uncouth on land, they are graceful enough in the water, swimming rapidly and easily with their fore-flippers, their hind legs apparently closed. A few were fully fourteen feet long, with the girth of an ox, and a weight that we estimated at fully fourteen hundredweight. They glanced fiercely at us, and bristled up their manes, looking exactly like swimming lions. They are usually dark grey in colour. We noticed, however, that though their teeth were formidable, they were blackened, and generally decayed.

Almost all the animals bore the marks of deep gashes, the result of frequent combats in the pairing season, when the males seize their rivals with indescribable fury, after roaring like bulls. They are most cruel to their wives (who are smaller in size), bullying them until they become worn out and thin.

Each male has from fifty to eighty mates. Each harem is kept distinct, and should there be any attempt at encroachment a fearful encounter takes place.

In these communities are certain cross-grained old bachelors — like rogue-elephants expelled for some dire offence — who live alone, snarling and barking, avoiding the society of ladies, and making themselves disagreeable to all and sundry of their species.

We sailed away without harming the water-lions and reached the lee-side of the island — deeply indented by coves beneath the precipitous cliffs — where the water was smooth. Suddenly, without the least warning, we found ourselves surrounded by a vast assemblage of sea-lions, sporting about and chasing great fish of twenty pounds weight or more which we could see in the clear water. We had none of us ever witnessed such a scene, and we fairly lost our heads.

All our party except myself were sailors, and being out for fun, were reckless and as full of it as a lot of overgrown boys. The lions, great and small — the young ones being big and powerful for their age — played close to the boat for, I should think, half an hour, popping to the surface in every direction, looking at us with curiosity for an instant, and again diving. Hundreds must have been about us, and if a concerted rush had been made, the boat would have been swamped in no time.

There was no alternative but to fire, not in self-defence, but for the purpose of securing specimens. We were all too wildly excited, however, to shoot straight. Our double-barrelled muzzle-loaders took a little time and care to re-charge, and it afterward transpired that one of us had kept capping and re-capping his gun, unaware that he had in his excitement rammed down the musket-

balls before the powder with the wad at the top. Another man went on loading until he had filled the barrel to the top, but luckily the gun would not go off, or we should all have been injured, crowded together as we were.

Not a lion was hit. As for me, at a very early stage in the adventure I was out of it, and could load no more, for I had left the ramrod in one of the barrels and blown it to pieces when I fired. We were determined, however, to return with something to exhibit at the club as a result of the day's outing. So we started for a distant and isolated rock, and softly landed, hoping to catch a big bachelor sea-lion asleep on the farther side. We did so, and mortally wounded him, but just as we got alongside him he contrived to tumble into the sea, and being not quite dead, came struggling to the surface.

Taking to our boat, we soon caught up to the creature, and some one foolishly gave him the contents of both barrels, when, to our great disappointment, he instantly sank into deep water. Of course, what ought to have been done was to have secured him first with a rope round his hind flippers.

Once more we essayed, and this time found a few females on another rock. We killed two outright, and returned late in the evening to the Chinchas, tired but triumphant.

Upon dissecting the carcases we found several good-sized pebbles in the stomach. The skippers declared they had been swallowed for ballast, but as a matter of fact all the seal tribe make use of them for much the same reason that fowls make use of gravel — to help to digest their food. The size and quantity of fish they consume is great. The bigger fish they secure in the kelp at the sea-bottom.

1.—Llama—often written Lama—were once considered to belong to the sheep family, but they are more closely allied to that of the camel.

2. -The Sea-Lion of Florida is more properly called the Manatee—the name given to it by the early Spanish explorers because of the hand-like use of its fore limbs.

JAGUARS — CAPYBARAS — ARMADILLOS — DEER — HORNED CATTLE.

Steaming up the Panama or the Uruguay (mighty twins that, united, form the River Plate) to Ascunçion, or to Salto, the traveller sometimes — especially after floods — meets with floating islands, *camelotas,* composed of water-plants which bind together the soft alluvial soil, and thickly covered with low trees and bushes, the growth of years.

These islands appear to be tenanted only by birds, but close inspection often reveals, as in my own experience, a large cat-like quadruped creeping through the cover. This is the jaguar, the " tigre " of the Spaniards.

Some of my fellow passengers, forgetting that the captain would not stop his boat for all the jaguars in the world, got their rifles and began a fusillade, but as they were bad shots the " tigre " lived to pass another day on his floating territory, where he was lord of all.

The home of that jaguar was in the lonely regions of Paraguay and the adjoining southern district of Brazil. But I have introduced him in this chapter because most of the beautiful skins, called by furriers, " great panther skins "— the back a rich tawny yellow marked with open circles of brown, sometimes with a star in the centre, the belly nearly white — are collected by the Indians and sent down to Buenos Ayres for shipment.

Restlessly pacing his den at the Zoo, or lying indifferent to everything, the jaguar does not show to advantage. He looks stumpy and less graceful than the leopards, but in his native forests he is the essence of activity, and the most dreaded of South American animals. Alligators and boa-constrictors occasionally overcome him, but only one quadruped, the great ant-bear, can vanquish him in a fair fight by tightly embracing him and tearing open his sides with its enormously powerful claws.

The beast can both climb and swim, and thus, by preying upon everything with life in it, secures a very varied

diet. He is powerful enough to kill with one blow of his paws the wild horses on the Paraguayan pampas, breaking their spines and carrying the carcases away. He is always on the prowl for them; the swiftest cannot escape him, but are seized with a strange paralysis of fear when chased, and quickly give in. The jaguar mounts to the very top of trees, climbing from one branch to the other in pursuit of monkeys that scatter with dismal whistlings in all directions. He lies in wait at the river-side for tapirs and capybaras, and, in spite of their tough hides, easily slays them.

The jaguar is an adroit fisher, and, crouched at full length along the lowest boughs of some overhanging tree, watches patiently until a fine four-pound pirai, or a fresh-water dolphin, swims beneath, when he instantly scoops it up with his claws.

The jaguar loves turtle, and silently waits until one crawls on to the sand spits to lay its eggs, then rushes on it, and with a dexterous turn of his talons, cleans out its shells as neatly as if with a dissecting knife, then digs up the eggs and surfeits himself.

Twice a day, at the rising and setting of the sun, the jaguar utters a peculiar cry, the one as if to announce his day's work had begun, the other that it had ended. It is somewhat alarming to hear it in the silence of the wood, unless one knows what it is, for it sounds as though a gun were being fired in some cavern, the pulsations rolling up in a startling manner through the thickly-growing trees.

The jaguar is a most dangerous animal to tackle, and to follow up a wounded one is to court serious injury, if not death. He might be up a tree, which makes him more dangerous than a tiger, for the latter cannot climb. He seldom attacks man, but will sometimes follow a mounted traveller for miles and fall upon him at night in his hammock.

If the jaguar is seen on the open plain the Indians run him down, and seize him with the lasso. He is generally hunted with a pack of dogs until "tree'd," then dis-

patched with a rifle; but no one single-handed should attempt this apparently simple venture — a miss or a slight wound, and the jaguar jumps down and furiously attacks the hunter.

A very daring feat is sometimes performed by the Indians or Guachos in destroying this ferocious cat. With his left arm encased in a rolled-up sheep's skin, and a sharp, five-feet long lance in the other hand, the intrepid hunter goes boldly to the animal, which has been driven out of the bushes. Lashing his great tail, and glaring with his green eyes at the intruder, the jaguar waits until sure of his spring, which the hunter parries with the protected arm, and with the firmly-held lance impales the brute, who thus brings about his own destruction.

The above feat, however, is not often attempted. The aspirant must have specially strong nerves, and must undergo a long course of training before venturing on it, for the slightest slip in parrying the blow would be fatal.

Capybaras (or *Carpinchos*).— When strolling with my dogs along the *arroyos* (rivulets) of the Rio Negro — an affluent of the Uruguay river — they used frequently to pause, give a prolonged sniff in the air, and start off, barking, into the thick reeds lining the banks; but the scent of the animals — something like that of an old boar — was as perceptible to myself as to the dogs. Then would be heard a great crashing and rustling, and with a grunt-like bark something would glide unseen into the water, while the dogs frantically proclaimed that the carpincho — for such it was — had been too quick for them.

One day I took with me only one dog, a steady old pointer. I had not been out half an hour when he came to a dead stop in front of a dense mass of water-side plants. Creeping quietly up and putting them cautiously on one side, I found what I had come to seek — a young carpincho, snugly curled up and fast asleep, and I prodded him with my stick. Up he jumped as if he had

been shot, and escaped into the stream, but gave me time to see him swim on the surface then dive and run along the bottom of the clear water.

I never shot these harmless animals, though often asked to do so by the guachos — native péons, or cattle men — who consider them good eating, and prize them for their hoglike hides, which they cut into strips and make into useful lashings.

Being aquatic creatures, they are so seldom seen that a description of them will, perhaps, not be out of place. Capybaras are the largest of the rodents (sometimes four feet long and proportionately stout), and are not unlike large-headed, blunt-nosed guinea pigs. Their legs are short and their feet slightly webbed; they have no visible tail, and the body is covered with coarse brownish hair. Their ears and eyes are small, and they have a fine set of gnawing front teeth. They have been described as "rabbits as large as sheep," and as "water-pigs much resembling the hippopotamus in shape and habits, but only about the size of a dog."

With their splendid incisors they gnaw and do much damage to plantations in the tropical parts of South America; but in the River Plate countries, the natural food — to which it is confined — is grass and roots. They are easy to tame when young, and will follow their owner about like a dog.

The cavies, to which tribe carpinchos belong, are found only in South America. Of the several varieties, the smallest is no bigger than a rat; and it is singular that this little creature, the well-known guinea-pig, whose domestication in Europe dates as far back as the middle of the sixteenth century, when it was first brought from Guiana, Peru, and Brazil, should have been persistently described as a native of the Guinea coast of South Africa. In its wild state it leads a nocturnal life, and burrows like all its species.

Armadillos.—"There!" said the German curator of the fine Buenos Ayres museum, pointing out to me the

shell of an animal mounted on wooden pedestals in lieu of feet, "When you return home you can tell your scientific friends that you have seen and handled the genuine remains of the glyptodon, a gigantic armadillo that used to roam about the Argentine plains."

I was duly impressed, but a short time afterward, when up country, I was introduced to the modern armadillo, at table, of all places in the world! I was at a dinner given by my host, the manager of the famous Liebig's Extract of Meat Factory and Estançia at Fray Bentos, when a savoury-smelling entrée was brought round to me, which looked like fricasséed chicken. It was delicious, something like delicate pork and fowl, and I indulged in a second helping. "What is it? I inquired. "An armadillo," was the reply, "the small kind. But the next time you shall have it roasted, in native style, in the shell." He fulfilled his promise, and I found it still more savoury.

Armadillos, residents of the great plains of Brazil, and also of the River Plate, vary in size from that of a small rabbit to about three feet in length, and when unrolled, with their heads and long upright ears poking out from their mailed backs, they look comically like jackasses gazing out from the front of an armoured train.

They may be classed amongst Nature's freaks, more like reptiles than animals. Instead of being covered with hair, the whole of the upper part of their short-legged bodies is protected by a cuirass composed of parallel rows of variously-shaped horny plates, extremely mobile, so that, hedgehog like, they can roll themselves up the instant they are outrun, which is their usual fate, as they cannot travel fast. Where the soil is soft, they scoop out a hole with their strong claws and disappear. Even if you are quick enough to catch them by the tail just before they disappear in the sand, no pulling will extract them.

To dig them out would be too tedious a process, occupying, perhaps, three-quarters of a day, so the guachos light a fire at the entrance, and when the fumes reach the armadillos they bolt, and they are easily captured.

Armadillos feed on insects and flesh, which latter in the River Plate they easily obtain from the dead cattle, sheep, and horses that lie about; but those near towns are accused of digging up corpses from the churchyard, and are consequently regarded with aversion as an article of food. When tightly rolled up, they look like a certain sort of Brazilian nut, and it would be difficult to tell the head from the tail were it not for an angular protuberance, which is really the *os frontis*.

The common wood-louse, closely resembles the armadillo, and rolls itself tightly up on approach of danger. Hood, in his "Haunted House," writes:

> "The wood-louse dropp'd and roll'd into a ball,
> Touch'd by an impulse occult or mechanic;
> And nameless beetles ran along the wall
> In universal panic."

Deer.—At one time, before railways opened up the country, many districts in the River Plate were covered with ostriches and deer peacefully grazing together. But when European immigration set in, their destruction became so great, that it was found necessary to protect them by law, and a heavy fine was imposed for killing them recklessly.

When I was in South America the few remaining large kind of deer with fine antlers kept close to the woods, but I have caught a glimpse of one in the brushwood of a river valley, and I have seen their skins for sale. The gáma (literally, "she deer"), a smaller kind, were fairly plentiful in the open country.

My host preserved the gámas, or, rather, he discouraged the catching of them, and when, at the town of Fray Bentos, he asked me if I would like to try my luck at procuring a pair of antlers and a skin for his wife, I considered myself favoured. Of course I said "Yes," and started on my solitary twelve-mile journey to the branch estançia, with many injunctions not to lose my way. "But," added Mr. X., "the old mare will take you

right if you let her alone. She has been backwards and forwards hundreds of times." I took his advice, for there were no landmarks, and I let my steed "gang her ain gait."

The estancia superintendent received me hospitably, giving me the national dish, *asado* (ribs of beef pierced through with an iron *asador* [spit], and stuck in the ground before the fire), which, though unsightly, was the sweetest meat I ever tasted. In a northerly direction a herd of cattle were feeding in the far distance, to which the superintendent pointed, saying, "You will very likely find deer there."

Thither I set off. Around me was abundant bird-life, above and below, but no sign of four-footed animal other than the herd. At last I reached its edge, and the steers and cows, after looking at me with unpleasant inquisitiveness, decided that I was harmless, and went on grazing.

Presently, to my astonishment, I espied a couple of small deer — a buck and a doe — feeding in the midst of the cattle about half a mile away. There were no bushes or hillocks to conceal me, and I wondered how I was to get within range. I hobbled the mare, and commenced to stalk, using the group of cattle as cover.

It was not comfortable work, for the cattle resented my presence (I was on foot, which they did not consider orthodox!), but gradually I lessened the distance between us to one hundred and fifty yards. Then I had to wait until the cattle got out of the line of fire.

My small-bore double rifle was ready, but my nerves were not, and, for the first time in my life, I had an attack of "buck-fever," and could not hold the weapon steady. I soon recovered, however, and with two shots I secured the buck, but it was poor sport going after these semi-domesticated creatures, as they are more easily approached than the strictly-preserved deer in the English parks.

Now came the question: How was I to get the skin and antlers home, for I had come out without a knife. While

lamenting my remissness, an old guacho appeared on the scene, to whom I tried to indicate by gestures that I wanted a knife, for he could not understand my poor attempt at Spanish. As soon as he comprehended my meaning, he whipped out a formidable-looking blade, knelt down, and dexterously skinned the buck, and was delighted when I gave him the carcase as his perquisite

The next day I rode back triumphant with the spoil and laid it before Madame X. After this adventure I sometimes galloped after the deer for a bit of fun, but never again drew trigger upon them.

Horned Cattle.— To quit the subject of River Plate animals without mentioning cattle, would be a mistake.

Whence did these cattle originally come? No remains of indigenous ones have ever been found, and the Indians retain no tradition of their existence before the advent of Europeans.

They were probably taken over by the Spaniards direct from the mother country when De Solis discovered the mighty Plate River, or they were imported into Brazil at an earlier period, and gradually made their way south, where under the favorable conditions of abundant water, unlimited pasturage, and suitable climate, they increased and multiplied exceedingly. They were then taken in hand by the cattle-farmers who soon discovered their worth in hides and tallow; and, finally, the original breed — scraggy and big-horned — were systematically crossed with shorthorns and other choice British types. Now the River Plate claims to have the finest cattle in the world; it also boasts of a greater number than any other country, not even excepting Australia, and to own forty thousand head is by no means uncommon.

1. The Sloth furnishes a remarkable instance of protective coloring; when they curl up to sleep they can rarely be distinguished by the keenest eyes.

2. The Puma is the largest of the Cat family on our continent. It rarely attacks men, but is very destructive to sheep and calves.

3. The Armadillo has a remarkable power of rapidly burying itself several feet under the ground.

4. The Ant Eater, like the Armadillo, is a toothless animal and also feeds on insects.

PUMAS — TAPIRS — ANT-EATERS — SLOTHS.

Pumas or Cougars.— Puma, the native name in Peru; Cougar, in Brazil.

"Well," said my host, an old Brazilian living in a province north of Rio de Janeiro, speaking good English, a rare accomplishment for one of his nationality, "I hear you have been out exploring all the day. Did you see any wild animals in the forest?"

"No," I replied. "But all the way back, two smooth-haired dogs with long tails kept alongside me in the underwood, though they never came near enough to let me clearly see what they were like. Do you keep big greyhounds, or mastiffs?"

"Two *dogs!* Why, they were *cougars!* And but for the succour of Our Lady" (here he crossed himself devoutly), "unarmed as you were, when darkness fell they might have attacked you!"

Thus, for the first time, I realised that cougars existed in Brazil, as well as in other countries of South America, and I recalled tales of their gently *pulling* at the ponchos of weary travellers who lay wrapped up in them fast asleep, and of their silently following hunters.

I also called to mind the fact that the great Edmund Kean, when in Clarges street, London, had a cougar called "Tom," given to him by Sir Edward Tucker. It used to follow him just like a dog in the crowded London thoroughfares, somewhat to the discomfort of the general public, who used to give it a wide berth. So did Kean's visitors, when brought unexpectedly face to face with the creature in his drawing-room. Kean tried to educate Tom, but the latter died before much progress had been made.

"So they were cougars, were they?" I exclaimed. "Have you many about here?"

"Not many. They are becoming very scarce; but I will tell you how you may know them. They are like lionesses, smooth-headed but not bigger than a large mastiff,

of uniform fawn colour, without spots. I'm not surprised you mistook them for dogs, especially as you could not see them distinctly."

"When I was younger than I am now," he continued, "there used to be plenty of cougars about, and a great nuisance they were. I have heard my father, who was a great traveller, say that in the Southern States of North America they used to be a pest, killing the sheep and hogs, fifty at a time, and — unlike other wild cats — slaying wholesale before beginning to feed, and then sucking only a little blood from each victim. Luckily they have been exterminated by the American farmers.

"With us," he went on, "they are found near rivers and in forests. If they suspect deer are about they will lie in wait for them in a tree (they are splendid climbers) and drop down upon them as they pass below. I am told that in the jungles of the Rio Segundo, in the Cordoba district of the Argentines, there are many cougars. They revel, unmolested, in its grand hunting-grounds, where deer, carpinchos, and such like abound.

"My father used to say," he continued, "that in the Rio Grande province — the cattle-raising part of Brazil — when the guachos found a cougar had been prowling about their houses after poultry, they went for him with dogs, ran him down, and put an end to him with a knock on the head from their *bolas,* or they lassoo'd him, and dragged him along the road until he was dead. Here, however, we go after the cougar with a pack of curs, whose yelping so maddens him that he rushes up a tree, where he angrily purrs like a cat. The rifle does the rest. The skin is really useful and makes a nice warm covering in chilly weather, while its flesh looks and tastes like veal."

Tapirs.—High up and in the recesses of the picturesque Organ Mountains, near Rio, are pools of water wherein the tapir — largest of all South American animals — used to delight to wallow (this was before the railway to Petropolis had made the district accessible),

and it was in this locality, on the banks of one of the numberless feeders of the Upper Tocantins (itself a great river, though a mere stream compared to its neighbour, the mighty Amazon), that I made their acquaintance.

I was meditating on the bird and insect life around me, and the aquatic life below, when I heard a rattling in the undergrowth and creeper-stems behind me, and just had time to see a large tapir with her calf crash through the reeds and dash into the water. This indicated that there was probably a jaguar or a cougar not far off, so I judiciously jumped into my boat and went elsewhere.

I had just time to observe that the tapir was a fine beast, about six feet long, but stumpy in body, legs, and tail, deep brown in colour, and with an absurdly short proboscis, a travesty of an elephant's trunk. This apology for a proboscis has no prehensile finger at the tip, and seems purposeless, for the creature eats and drinks in the ordinary manner. Perhaps it is of use in pulling down the tender wild fruit, and in grubbing up the aquatic plants that it feeds upon. The hair of the tapir is scanty, and lies so flat on the surface as to be hardly perceptible. The males have a mane of stiff bristles at the back of the neck. Its muscular strength, I believe, is enormous, and this, together with the toughness and thickness of the hide — almost impervious to a musket-ball — enables it to tear through the thorniest and closest thicket.

Peaceful by nature as the tapir is, when attacked by dogs it will seize them, and with its teeth cut the flesh clean off their limbs.

When tamed (an easy process) a tapir will let any liberty be taken with it, not even showing resentment when domestic animals run off with its food. Indians eat the flesh of the tapir, but it is dry and insipid.

Ant-eaters.— In the midst of the Tijuca, mountains, only eight miles from the city of Rio de Janeiro, on a lovely site in the forest primeval, there used to be a boarding-house kept by a Mr. Bennett, an intelligent

Englishman. He was a naturalist, and fond of collecting all kinds of animals as pets. Amongst them was a young ant-eater from Minas Geraes, the mining centre of Brazil, a creature I never tired of watching.

The arrival of a great ant-eater at the London Zoo was once regarded as a great event. Instead of its natural food, it had bread soaked in milk, yolk of eggs, and occasionally ant-eggs and the blood of freshly-killed rabbits.

But at "Bennett's" its dietary was simple enough, for "Bennett's" was in the land of ants, where they often rear mounds of earth forty yards round and two feet high. Certain kinds of ants build columnar hillocks of earth from three to six feet in height, which are baked exceedingly hard by the sun. These the ant-bear, as it is sometimes called, attacks and breaks down with its formidable claws, provided for that purpose. "We see," says Charles Waterton, "that every portion of an animal's body is adapted to its journey through life, be that life of very short duration, or be it prolonged to a great extent. What could the ant-bear do without its tremendous claws and cylinder-shaped snout, so tough as to enable it to perforate huge nests of ants, which, in certain districts of Southern America, appear more like the roofs of Chinese temples than the work and habitations of insignificant little insects?"

Bennett's ant-eater was taken at regular intervals by a boy into a forest to feed, and showed no disposition to escape. In fact, its movements were, like those of a sloth, too sluggish, and, with its claws doubled up under its feet, it could not have run if it had tried. It uttered no sound, and wherever the lad placed it there it remained until he came back. The ant-hills round about Bennett's were low and rather soft, and exactly suited its immature powers. It easily pulled them to pieces, and, thrusting its long saliva-covered flexible tongue into the seething mass, would withdraw it covered with ants, repeating the process until the ant-heap was exhausted.

When asleep, it lay on one side, its nose resting on its

breast, its four legs drawn together, and its curled-up body completely covered by its bushy tail. It resembled nothing so such as a bundle of hay.

The ant-eater is larger than is generally supposed. For instance, the great ant-eater (there are several smaller kinds) sometimes measures eight feet from the tip of its nose to the end of its tail, which appendage, by the way, is a wonderful affair covered with very long hair that sweeps the ground like a lady's train, and can be raised like a plume. In Brazil it is called the banner ant-eater, because it has on each side of its shoulders a broad oblique black and grey stripe, somewhat resembling an heraldic flag. The general colour of its body is dark.

Helpless and harmless as the ant-bear looks, tricks should not be played with it. One of its habits is decidedly bear-like, as the following will show: A naturalist came suddenly upon a very fine specimen, and thoughtlessly seized it by its long snout. The bear instantly rose on its hind legs and clasped him round the middle so tightly that he was helpless. Luckily his companion came to his rescue, and after vainly trying to beat the bear off, fired at it, for nothing short of a pistol ball would have made the creature relax its hold. When measured, it was found to be six feet to the tip of its tail, its hair-tuft giving another four feet.

Sloths.—"Decidedly an uninteresting animal," was the general verdict when the first two-toed sloth arrived at the Zoological Gardens in London.

To be compelled to wait outside its cage, say, for an hour before one had the small satisfaction of seeing the creature even attempt to move, and then, perhaps, only to the extent of drooping its reversed head in miserable fashion, was hardly calculated to inspire enthusiasm. And when it had the enterprise to descend from the tree (to the branches of which it clung always from below, never from above), it was pronounced to be a deformity. This is because the peculiar formation of a sloth's fore legs, which are much longer than the hind ones, and the

hooked claws doubled up under the toes, make any attempt at walking a farce. It can only contrive to drag itself along on its knees, as it were, yet, strangely enough, it can swim well, and often frequents rivers three hundred yards wide.

The sloth is a sylvan creature. Trees supply it with both board and lodging. It sleeps on the fork of a tree, tightly clinging to one of the branches, with its back resting in the angle, and its head pillowed on its breast. It looks like a wooly ball, and is impervious to the attack of the myriad insects that infest the woods.

When in search of fresh pasture thet sloth goes from tree to tree at a good pace, but when at work upon one particular tree its movements are very deliberate, betokening caution rather than laziness. It never lets go its grasp of one branch before securing its hold of another, rising on its hind legs, looking around and grasping about in search of a new foothold. All who have studied the sloth's habits in its natural home, the forest, admit that the epithet "sloth," as applied to sluggish people, is a misnomer.

Monkeys.— South America, and especially Brazil, is the land of monkeys, varying in size and form, but alike in that they have prehensile tails, which the monkey denizens of the Old World have not.

Charles Waterton, the famous traveller, who had more practical acquaintance with wild monkeys than any one before or since, says:

"The prehensile tail is a most curious thing. It has been denominated very appropriately a fifth hand. It is of manifest advantage to the animal, either when sitting in repose on the branch of a tree or when on its journey onwards in the gloomy recesses of the wilderness. You may see this monkey catching hold of the branches with its hands and at the same moment twisting its tail round one of them, as if in want of additional support; and this prehensile tail is sufficiently strong to hold the animal in its place, even when all its four limbs are detached from the tree; so that it can swing to and fro and

amuse itself solely through the instrumentality of its prehensile tail, which, by the way, would be of no manner of use to it did accident or misfortune force the monkey to take up a temporary abode on the ground. For several inches from the extremity, by nature and by constant use, this tail has assumed somewhat the appearance of the inside of a man's finger, entirely denuded of hair or fur.

"By way of recapitulation, then, let the young naturalist, when he turns his thoughts on the monkey family, always bear in mind that . . . when a monkey presents itself before him with a prehensile tail, he may be as sure as he is of the rising sun, it is from the never-ending forests of the New World."

So far so good. But the question naturally arises: Why have not the monkeys of the Old World,—many of them arboreal,—prehensile tails, since their requirements and surroundings are identical with those of South America?

In the Brazilian spider-monkey the tail as a prehensile organ attains to perfection, and its great length and its slenderness of body and limbs accounts for its designation.

A familiar picture in some books of travel is that of a living bridge over a forest stream. This bridge is composed of monkeys, one of which grasps a tree, another holding on to him, and another on to *him,* and so on, until a long chain of monkeys is formed, which, when violently oscillated, swings to a tree on the opposite side and is immediately grasped by the last monkey.

If such a feat could be performed by monkeys, it would be by spider-monkeys. With their wonderful tails they can seize upon objects placed behind them without moving their bodies or letting their eyes co-operate in the action.

There are more spider-monkeys kept as pets in Brazil than any other kind, so readily tamed are they, and they become so accustomed to man and the human voice that, when scolded, they weep and wail like spoiled children.

There are some little monkeys that are pleasant companions. My favorites in Brazil were capuchins and marmosets, the former with hair so short on the top of their head as to give an appearance of baldness, and with a ring of long hair below, making them look not unlike tonsured monks.

There were both capuchins and marmosets at " Bennett's," and the guests used to play tricks on them. The little capuchins loved the smell of tobacco, and when puffs of smoke were blown towards them they would rub their faces ecstatically with their hands as though rubbing in some tangible substance, like soap.

Marmosets are charmingly unmonkeylike — something like very small cats in appearance (the body nine inches long and tail fifteen inches), as well as in disposition and habit. When angry they hiss and growl, and show their teeth. They are querulous when first captured, but soon become tame and familiar and playful as kittens. They are not unlike squirrels in their nimbleness among the trees. In face they are like miniature old men with whiskers. They have long black manes like diminutive lions, and thick, black, soft, chinchilla-like fur. Though their heads are small, they are very intelligent. They are able to recognise pictures; they like to look at themselves in a looking-glass; at the sight of a wasp they will tightly shut their eyes (terrified at it, even in a picture), but woe betide the luckless spider or cockroach that enters their cage — it is captured and devoured instantly.

The marmosets at " Bennett's " were fond of oranges. One once accidentally squirted some juice into its face, and ever afterwards, when eating an orange, shut its eyes. I used to offer them pieces of meat, which they invariably refused, although they eagerly scooped out and ate the brains of dead chickens and rats. Their usual food was eggs, sugar, bread, soft-bodied insects, and tropical fruits, but I regret to say they had a surprising liking for stimulants. Once a mischievous visitor gave them some wine; they asked for more, and got it, and became helplessly intoxicated, in which deplorable

condition they presented a most miserable appearance. I am glad to say that after that humiliating experience they, like Rip Van Winkle, " swore off."

One day a negro brought in from the forest a dead snake called a jararaca, a hideous reptile with a flat triangular head joined to the body by a thin neck, the bite of which is generally fatal. When it was thoughtlessly held up close to the marmoset cage, the poor little occupant went into convulsions of terror, and it was many hours before he recovered.

I took several marmosets back with me, and they became great favourites on board ship, though they were sometimes rather troublesome. When released they would run up the rigging more swiftly than any sailor, and decline to come down for several hours. They could not bear rough usage, and one of them, after having been systematically teased, died of grief.

I fed them on bread, apples, and as many black-beetles as I could procure in the well-kept mail-steamer. As a treat I gave them chicken bones to suck, and once a few mice that had been caught and killed, which they devoured in a curious way. Beginning at the top, they carefully pushed back the skin, eating the bones and all the body, until the tail was reached, when nothing was left but the pelt.

Vampires.— In the Middle Ages no superstition had a greater hold upon the minds of all classes of people than that of the existence of ghouls and vampires energised by fiends.

The former were supposed to be evil spirits that temporarily assumed human forms, visiting graves at night and feeding upon their gruesome contents, declining all food in the daytime yet preserving an appearance of perfect health.

Vampires were supposed to be dead people who retained a semblance of life, showing no outward signs of decay, though devoid of breath. After dark they were supposed to leave their tombs and, assuming various

forms, generally those of huge bats, creep into bedrooms night after night, and suck the blood of some sleeping victim, who gradually pined away from sheer exhaustion.

When the identity of this kind of vampire could be determined one course only was open to stop its ravages. Its body was exhumed, taken into the church, and before the altar its evil spirit was solemnly exorcised, and a sharp stake driven into its heart. With a horrible yell and terrible convulsions the fiend departed, and the corpse instantly resolved into natural decay.

No doubt these ideas hailed from the East, and when the early explorers of South America gravely asserted that they had both seen and felt vampire-bats at their fell work of blood-sucking, and when they exhibited the skin of one of them, its repulsive appearance confirmed the superstitution that they were emissaries of the Evil One.

Imagine a huge bat, twenty-eight to twenty inches in expanse of wing — the width of a guinea-fowl's. Nothing can be more hideous and diabolical than a side view of it. Huge leathery ears sticking out from the top and sides of the head, an erect, leaf-like appendage on the tip of the nose, eyes black and glistening, and a sardonic grin on its mouth.

In Brazil there are vampire-bats that are harmless, and others that undoubtedly suck the blood of animals and mankind. Though in Europe considerable scepticism has been expressed on the subject, there is abundant evidence that in South America they indulge their sanguinary appetite, as well as their healthy craving for a fruit diet.

They frequent hollow trees, and in the depth of the forest can be seen hanging from the branches in clusters, with their bodies downward, and their heads upturned on their reversed chests — an astounding position, unique in the animal world.

The *modus operandi* of these fiends is to fan their slumbering victims into a deeper sleep, then to make a fine incision (rather smaller than that produced by a

leech) with one of their long canine teeth in the toes of human beings, the ears or shoulders of oxen and mules, and the combs of poultry; but accurate observers maintain that the puncture is made by the sharp hooked nail of the vampire's thumb, and the blood abstracted by the suctional power of its tongue and lip.

It is nothing unusual in Brazil to meet with negroes covered with scars, the result of vampire-bites. Vampires appear to prefer African to European blood, and although Charles Waterton lived eleven months in the middle of the forests of Guiana, in a deserted wood-cutter's hut, where vampires abounded, they never bit him, but they greatly plagued his negroes.

CURIOUS ANIMALS OF AUSTRALIA.

BY

ARTHUR H. BEAVAN.

KANGAROOS — OPOSSUMS.

MARSUPIALS of gigantic size, larger than a horse, existed on the Australian Island Continent in bygone ages, and were succeeded by others of more moderate proportions. These latter, though acquainted with the naked, wavy-haired aborigines, remained in blissful ignorance of pale and well-clothed Europeans with their deadly firearms, until the year 1770, when a bluff-bowed little ship, the Endeavour, 350 tons, commanded by a certain Captain James Cook, dropped her anchor in the shallow water of Botany Bay, effected a landing, and took possession of the new territory in the name of King George the Third. A few days later, the splendid harbour of Port Jackson, so called after the sailor who from the fore-top first sighted the

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entrance, was discovered some miles further north along the coast, where, on the site of the future city of Sydney, Captain Cook and his crew looked for the first time upon that strange animal, the kangaroo. The natives, he thought, called it "kangaroo," but he probably misunderstood their pronunciation of the word "koora." However, the former name was adopted and remains, while the animal has become the honored symbol of Australia, just as the lion is that of England and the eagle that of America — though anything more unlike a lion it would be difficult to find.

The kangaroo boasts a height of between five and six feet, and a weight of, sometimes, a hundred and forty pounds. It has a head like a doe's, long sensitive ears, and large expressive, gentle eyes, a graceful grayish-brown body covered with wooly fur, short, slender fore limbs, and very powerful hind-quarters terminating in a rigid tail, three feet long, which helps to balance the animal in its tremendous jumps of twenty or thirty feet. One feature it has in common with the lion — its *claws,* which are sharp and formidable, one of the four in each hind leg being a veritable dagger of great size and efficiency. But in disposition, the kangaroo is utterly unlike the king of beasts. Mild, peaceable, easily tamed, and adaptable to every climate and to captivity, there is no reason why it should not be extensively domesticated; while, if well fed, the quality of the flesh would be so much improved, that it would form a welcome change in the dietary of eternal beef and mutton. In the wild animal the meat is tasteless and dry, and only the tail, which makes an excellent substitute for hare-soup, is eaten by Europeans.

Of course the pouch, or abdominal bag, in which the female carries her young until able to shift for themselves, gives the name of "marsupial" to this species of animal; and very funny it is to see the "running Joey," as the growing baby is called, peeping out of its cozy retreat, while its mother is jumping along as fast as she can.

There are over thirty kinds of kangaroos, ranging in height from six feet to one foot, and known by various names, such as the great gray, wallaby, rock-wallaby, paddy-melon, rat, mouse, and the strange tree-kangaroo of North Queensland, which, though a kangaroo, is essentially an arboreal animal, dwelling in trees which it readily climbs, and is called by the blacks the "Bungary."

Were it not for the provision of a pouch, the very young kangaroos — in a normally droughty continent like Australia, where long distances exist between the water-holes — could not travel with their parents, and would consequently perish.

In the old squatting days, kangaroos were very numerous in some districts, and did a lot of mischief by eating off the grass, though they were to some extent kept in check by the dingoes, or wild dogs, who, however, began to find that the flesh of sheep was superior to kangaroo venison. So the dingoes were ruthlessly destroyed, and the kangaroos multiplied once more. At last it was discovered that their skins made good leather; an export demand arose, and they were shot down for the British market. Thus, they have become scare in the vicinity of towns, and are only seen in numbers a long way up country.

I recollect noticing years ago when in the district of Schnapper Point, Port Philip, not many miles from Melbourne, that there were plenty of kangaroos. They went about in mobs of from ten to forty, presided over by a big male ("boomer," or "old man," he is called) who kept order. One day my host (in the literal sense that he was the landlord of the hotel) asked me to join him in a kangaroo hunt. So very early the next morning we set off, well mounted and accompanied by several splendid dogs, crosses between deerhound and greyhound, or foxhound and greyhound with a dash of colley, I forget which.

For some miles we went leisurely along the monotonous plain, each tree looking alike — varying only in size

— with their straggling branches and sombre foliage, enlivened, however, by the shrill cries of parrots and parakeets as they flashed past in a blotch of blue, red and green.

The colour of kangaroos so exactly assimilates with their surroundings in the bush that it is well-nigh impossible to distinguish them until almost on the top of a "mob." So when my friend whispered, "There they are!" and prepared to loose the dogs from the leash attached to his saddle-bow, I could see nothing.

Off went the hounds, and up jumped the game, visible enough now, as they took flying leaps over every obstacle at great speed. Away we galloped, the horses needing no encouragement; in fact, mine got beyond control, and carried me recklessly under low boughs, nearly bringing me to grief. My eyes were blinded by the thick cobwebs hanging from the thickly-growing trees, and every few minutes I had to put the horse over fallen trees and water-creeks. Mile after mile we held upon our reckless course, and when we came to a clearing, the pace redoubled.

The bandicoots, frightened out of their wits, scuttled away from our horses' feet to their lair in a hollow tree. Then we swept past a shepherd's hut, and his puppy tried to join us in the chase, thought better of it, and merely barked his encouragement.

The grey figures ahead still held on, until we thought the hunt would never end. But at last the pace began to slacken, the dogs gradually drew upon the kangaroos as their boundings grew shorter and shorter, until, singling out the biggest, they threw themselves upon it, and down he went in a cloud of dust.

In a minute we were upon him. As he sat upright, his tail and hind-quarters defiant, a dexterous thrust of a keen knife soon put him *hors de combat,* but in his last struggle he contrived with his hind claws to rip up the flanks of two of the best dogs.

Until high noon we repeated these hunts, for kangaroos were swarming in every direction, until, tired out

1.—The Platypus Ornithorhyncus is one of the most remarkable animals in the world, partaking of qualities which belong to both bird and beast.

2.—The Kangaroo was unknown to the world until Captain Cook discovered it in Australia in the year 1770.

and with a sack full of tails and claws as mementoes, we turned back. My horse was so done upon that I had to lead it, and in crossing a dried-up stream, the poor beast got its hindquarters jammed, in some extraordinary way, under an overhanging bank. It either could not or would not move, and so my host had to ride ahead for a spade to dig it out, leaving me alone in the bush. Right glad was I to find myself that evening back in the cosy hotel, sitting over a refreshing cup of tea and a dish of succulent mutton chops.

In various parts of Australia I have shot kangaroos with the rifle but they are very wary, keen of hearing, and their height enables them to see the gunner a long way off. The least noise, such as the snapping of a twig underfoot, startles them. In fact, kangaroo-stalking is almost more tedious than crawling along the Highland moors on the chance of bringing down a stag, which is supposed to be the most fatiguing of all sport. If the hunter's back aches insupportably he may lie down and die, but must not, to save his life, move an inch; and, on occasion, he ought to be able to run like an antelope, or, in a stooping position, at a greyhound pace; and furthermore he must be able to breathe steadily as the trade-winds.

Once, and only once, I saw kangaroos fighting. Every year the females select their mates, and then it is that battles royal occur between the males.

I had stalked a mob, when my attention was arrested by a sudden combat between two powerful "old men," the does standing apart as spectators ready to accept the victor. The males danced around each other, waiting, like wrestlers, for a chance to close. To the right and left they hopped for the death grip. At last one caught the other round the neck, but his foe was too quick for him. He planted a paw on the face of his opponent and forced his head back so that he could not raise his formidable hind legs from the ground. Then, with a terrible slash from his own hind claw, he laid open his rival's side, and, while he rolled over, dead, the conqueror hopped off to receive the congratulations of his newly-acquired harem.

Opossums.—Long before the study of natural history had arrived at its present stage, with its puzzling nomenclature and classifications, the original colonists of Australia, finding animals there somewhat similar to those they were acquainted with in the Old Country, or had read of in books, bestowed upon them the same names. They called the thyacine, the native wolf; the common dasyurus, the native cat; the koala, the native bear; the bandicoot, the native rabbit; the phalanger, the native squirrel; the petaurus, the flying squirrel; the echidna, the native porcupine; the platypus, the water-mole; and the planlanger, the opossum, but we are told by scientists that it is no opossum at all, the genuine article being closely allied to the dasyurus or native cat, and confined to the American continents, ranging from the United States to Argentina. However, the old colonials regarded their "possums," as equal, if not better, than other "possums," and by that name they will be known as long as the new Commonwealth lasts.

In the side-splitting farce, "Charley's Aunt," the chief character describes Brazil as the place "where the nuts come from." So, to many people, Tasmania is the land where "possum rugs came from." I say *came* from, because to get hold of one now is impossible, without paying an exorbitant price.

'Possums exist all over the Australian continent, but those in Tasmania have the thickest and best fur. The first thing a visitor to Hobart does, after gazing at Mount Wellington and admiring its snow-speckled peak, is to explore the streets in search of a shop where rugs and skins are sold. The idea in their minds is that a 'possum-rug is *the* present most coveted by their friends in Sydney or Melbourne, and that in Tasmania it can be purchased at a moderate price; but they soon discover that to secure a really good one they must pay half as much again as they would anywhere in Australia or London, where $50 will buy a very fair specimen of the black opossum carriage-wrap.

This particular 'possum, the black variety, is restricted

to Tasmania, and would long ago have become extinct but for the stringent restrictions regarding its slaughter. On the Island Continent the aborigines aid in its destruction, not for the sake of its fur, but for its flesh. No 'possum, be it ever so cunning in "lying low," escapes them, a scratch on the bark of a hollow gum-tree (their favorite resort), or a scrap of fur at the base, being sufficient guide to their practised eye. Climbing the bare trunk of a tree with wonderful agility, they ascertain, by tapping, the exact spot where 'possum is reposing; then, cutting a hole in the usually rotten wood, they drag the prize out, knock it on the head, and proceed to cook it after a very primitive fashion, flinging it, skin and all, upon a wood fire. When half-roasted they tear it in pieces and eat it without the aid of knife and fork.

The flesh is rank, opossums' food consisting chiefly of strongly-flavoured leaves, varied by, perhaps, small birds, but when Australia became settled the 'possum developed a decided taste for fruit, not the native fruit, which is tasteless, but the products of cultivated orchards.

Up country in Victoria, I used to stay with a farmer. My bedroom was at the back of the house in the bachelor's quarter, shut off from the main building, the door facing the courtyard, and the French window a large fruit garden. One morning, in the chilly small hours I was awakened by a furious barking, and, looking out, I saw that two of the dogs had tree'd something which they were frantically endeavoring to reach.

Taking my gun from its rack, and donning a dressing-gown, I went out, and by the bright moonlight could see, crouched motionless on the lowest branch of a peach-tree a 'possum. Down it came, and, with visions of rugs, I leisurely went to pick it up. But I had forgotten the dogs, and by the time I had rescued the carcass from "Jack" and "Bill," hardly a scrap of fur remained on the worthless skin.

The next night I took care that the "pack" was chained up. They smelt the quarry, and gave me the tip

in good time, and all night at intervals I was able to bag a number of these queer little beasts. Queer in many respects, like all marsupials, are opossums. They have prehensile tails, and frequently the skin-hunter, after wandering about for hours at night in districts where they are scarce, scrutinising the trees overhead, and getting into line with the moon every likely-looking fork that might harbor a 'possum, at last finds one, and kills it. But, alas! in falling its tail catches, and contracts round a branch, and it swings inaccessible and useless.

Opossums love warmth, and one winter morning (for it can be very cold in Australia) my host's wife got up early to attend to some domestic duty, and went into the kitchen where a huge wood fire was kept burning all the year round, only partly dying out at night. In front of it stood a large clothes'-horse, which during the day had borne sundry well-washed garments, and to the good woman's intense surprise she saw a 'possum with its tail tightly curled round the top rail, asleep. It woke up with a start, stared hard at her for a second, and vanished through the door.

Native Bears.— I daresay many of my readers picture the native bear to be a fair-sized animal with formidable claws, a thick fur, no perceptible tail, and an insatiable appetite for cake — in fact, an Antipodean representative of the well-known bears at the Zoo; but as the koala (to give it the correct name) has rarely been brought over alive to England for many years, their ignorance is excusable.

If only the creature would eat something besides gum-leaves and twigs, it could easily be conveyed abroad, but it will not, and the fodder stored up for it in the steamer's chilled room has a tiresome knack of going bad, or giving out, just at the critical moment — say when crossing the Bay of Biscay — and the bear declines to survive, a mishap which I have always thought could be prevented by the exercise of a little more care and forethought. Once safely landed fresh gum-leaves could be obtained for it, though at some cost, for unfortunately

the eucalyptus that the bear prefers is not the common kind, but a peppermint variety rarely cultivated. It is a pity that the importation cannot be accomplished, as the koala is a most comical-looking beast and would be a safe card in a menagerie.

About as big as a moderate-sized dog, with a tail (can we call it a tail!) about the size and shape of a coat-button hidden in its fur, a grey wooly hide, sharp claws, weak jaw and small teeth, large staring eyes, and big ears furnished with a fringe of erect hairs, it looks for all the world like a testy old gentleman who has been ruthlessly wakened out of his after-dinner sleep and wants to know the reason why!

The koala's habits are sluggish, and though able to climb well, it moves about the trees in a most deliberate manner. Seldom coming to the ground, except to climb another tree, or to search for roots, it walks awkwardly, shuffling along (though pretty quickly) like a plantigrade.

Though koalas are said to be nocturnal, I have seen in the daytime a good many of both sexes. Sometimes one of them selects a branch so low down as to permit of close inspection, betraying no fear unless molested, when it quickly mounts to the top, almost out of range of a shotgun.

The female often sits with her solitary babe on her back in comical fashion.

Henry Kingsley, in "Geoffrey Hamlyn," gives a true picture of the bear's seeming indifference, or philosophy, call it what you will. A little child strays in the bush and is not found until days afterwards, dead. "A wee little native bear," he says, "hardly eight inches long, a little grey beast, comical beyond expression, with broad flat ears, sits on a tree within reach. He makes no resistance, but cuddles into the child's bosom and eats a leaf as they go along; while his mother sits aloft, grunting indignant at the abstraction of her offspring, but on the whole taking it pretty comfortably, and goes on with her dinner of peppermint leaves."

An English friend commissioned me to bring him back

the finest native-bear rug procurable, and I had to scour the district for skins in good condition.

Not far from Melbourne lie the thickly-wooded Plenty ranges, and there was my happy hunting-ground. Day after day I went out, sometimes on foot, more often on a steady old horse, for I soon found that dead bears were too ponderous to drag about. To lessen the weight I used to skin some of them, a disagreeable and tedious work, the pelt being so firmly attached to the flesh; while countless blow-flies buzzed about, appearing from goodness knows where, directly they scented a "kill."

Gradually I obtained the full tale of skins, for which I wandered far into the bush, sometimes finding only one bear in every hundred trees.

Once I bagged a female bear, not knowing she had a little one with her. It was uninjured, however, and clung to me with inconvenient ardor all the way home. I tried to rear it on cow's milk, and succeeded for a week, keeping the poor thing dry and warm; but it lacked something unprocurable, became very bilious, and, after sitting up with it for two nights, I had to mourn its loss.

My best capture was a fine, almost full-grown bear, with beautiful light gray fur. I conveyed it to my home, where it was placed in a large open air cage, and fed with leaves, the children of course making a great fuss over it; but when teased, though usually silent, it would give a kind of growling hiss. It escaped once, but after running a good distance was ignominiously brought back in a sack. Mr. Bear was at last set at liberty, and took up his quarters on a large gum-tree in front of the house, as if fond of human society.

Wombats.— In one of the small outlying enclosures of the London Zoo is a curious Australian animal, which, however, cannot always be seen, being, like so many interesting creatures, provokingly nocturnal in its habits. It is the wombat, a bulky marsupial, whose brethren in Australia attain to a weight of seventy pounds, and a length of three feet eight inches.

A hairy, ungraceful animal is the wombat, something like a giant mole or marmot, stout, clumsy, with short legs and small feet, its color sandy brown in various shades mingled with black, its ears small, eyes far apart and insignificant, the profile of head not unlike a guinea-pig's, a jaw in which the teeth grow continuously (not from roots), each jaw being furnished with a single pair of powerful incisors, thus completing its likeness to the rodent. It is apparently tailless, though it has a rudimentary one hidden beneath its long hair.

Hobbling and awkward in its usual gait, the wombat, when under fire, runs back to its hole as fast as a rabbit. It is essentially a burrower, and excavates on its own account with its sharp claws, though the Tasmanian variety sometimes makes use of natural clefts and holes.

A harmless beast, living on grass and roots, its fur is of no value, and its red flesh, though said by some people — chiefly bushmen — to be delicate eating and worth introducing into this country, is by more fastidious people pronounced to be too rich and fat.

At one time wombats were plentiful, living sociably together in families, but they are becoming scarce.

Almost all Australian children are fond of pets, and my farmer friend's children were no exception to the rule. So when the native bear was discarded, they petitioned the authorities to let them have a tame wombat. This was rather a large order, as there was not one in the district or anywhere near it. After much delay, however, rendered endurable by the advent of some young 'possums, a wombat arrived from a remote sheep station, and was welcomed with acclamation.

In spite of its thick skin, the creature seemed a chilly subject, always — when not burrowing in the sandy soil and covering itself up with it, and having to be dug out — running about and nestling in straw or in any clothes that it happened to find lying about indoors. The children fed it with potatoes, carrots, and hay, which last it nibbled bit by bit with its beaver-like front teeth. It seemed to know us, and would respond to its name

"Joey," and so far divested itself of nocturnal habits as to trot about in the daytime like a dog after the young people, who would pull it about mercilessly, and then, to make amends, take it up, heavy as it was, on their lap, where it usually fell fast asleep.

Like all marsupials, Joey was silent, except when unduly teased, then it would utter a low hiss. It once bit the farmer's eldest boy rather severely, which really served him right, for he would persist in offering it a succulent carrot, and just as Joey was licking his lips in anticipation, would withdraw it with a jerk, at the same time pulling him back by his hind legs.

Native Dogs.— Next to droughts, the greatest trouble that beset the early squatters and farmers of Australia was the native dogs, or dingoes. They swarmed in certain localities, and finding sheep easier to kill than kangaroos, and mutton more tasty than "old man" venison, harassed the flocks right and left, destroying many more than they could devour, and frightening the remainder out of their wits. It was no uncommon thing for a squatter to find in a morning dozens and dozens of sheep with their throats torn open. A single dingo has been known to run-amuck on a "run," snapping at the sheep as he went, but only eating a paunch or two — a favourite morsel. What with these pests, and kangaroos that ate the grass, and caterpillars that ruined every green thing, the original settlers had substantial ground for grumbling, a privilege much indulged in by farmers generally, who sometimes invent a cause of complaint, if none exist.

The origin of the dingo (a non-marsupial) is rather doubtful, but it is the only true wild dog in the world, and lives in such absolute savagery that even the aborigines can only bring up the pups, which they steal, in a semi-domesticated state.

Some think that the dingo is indigenous to Australia (in Tasmania it is unknown); others, that it was introduced at a very remote period from Asia by early Malayan settlers. But the fact remains that, as a dog, it

holds an unique position, resembling that of the Barbary ape, or the Rock of Gibraltar.

In appearance the dingo is like a fair-sized dog with a curled bushy tail, a fox-like head, and erect ears. It has no voice but a dismal howl; it is a cowardly brute, and, like the fox, when run down, feigns death, so that old bushmen take care to cut its throat at once.

Strychnine, applied as bait and scattered about the runs, nearly abolished these plagues, and, except in very out-of-the-way parts of the colonies, it is rare to catch a glimpse of a dingo sneaking through the bush.

Native Cats.—Native cats appropriately follow the subject of native dogs; but we must not think of them as well-behaved Tabbies and Tibbies basking in the sun, or comfortably stretched on the hearthrug in front of a bright winter fire. No; these weasel-like, slender pussies are ferocious marauders, about eighteen inches long, with a bushy tail, and are the pest of housewives, and, in the creed of all Australian dogs worth their keep, fit only to be classed with opossums and other obnoxious animals, and to be hunted into holes, whenever possible.

Though naturally bush-dwellers, where amongst the trees they prey upon birds and eggs, they must needs locate themselves near the habitations of man, whose feathered live stock saves them the trouble of working hard to procure food. Thus, after lying up snugly by day in hollow logs or holes they make for the poultry-house and work terrible havoc in no time. I recollect being awakened by a terrific row in the farmyard—the frantic barking of dogs, and the spitting and swearing of some wild animal, almost drowned by the cackling of terrified cocks and hens. In the fowlhouse were two native cats fiercely defending themselves against a plucky terrier, who, mauled about the face, would have found the task too much for him, had I not arrived on the scene just in time to knock on the head a pair of miniature tigers, which animals they resemble both in stubbornness and in their indifference to danger, fearing neither anybody nor anything.

One of the farm hands once brought to the house three native cats he had trapped. With no little difficulty they were manoeuvred into a strong cage and left there foodless for twenty-four hours, to quiet down. At the expiration of that period two only remained, each in a corner glaring at one another in the most watchful and savage manner. The cage was sound, but bits of fur scattered about revealed the fact that the missing one had been eaten; and each survivor was simply watching and waiting for the least sign of exhaustion on the part of the other, to pounce upon it.

While 'possum shooting, my dogs often put up native cats on the margin of swampy ground. They always made for small trees, though poor climbers and not having — like some marsupials — prehensile tails. One good attribute they possess, and that is a soft and pretty gray fur, at one time much used for lining ladies' cloaks.

Tasmanian Wolf.— The Tasmanian wolf is the biggest of the carnivorous marsupials. It is confined to the island formerly called Van Diemen's Land, and is all but extinct. Being difficult to find and difficult to trap, it is rarely seen in any collection. There were two specimens at the Zoo in London many years ago, but they have gone the way of all flesh.

It is a handsome beast, from four to five feet long over all, and resembles an ordinary wolf. It has transverse bars or stripes across and down its hind-quarters, which explains its alternative names, tiger and zebra. Its tail is peculiar, being carried as if it were solid and jointless, and serves merely as a balance when running. Its large, intelligent eyes are placed far apart and give a somewhat pathetic and gentle expression to its face, which belies its disposition, for its ferocity is so great that several dogs together often decline to attack a big old male.

Formerly these wolves abounded, harboring in the rocks of inaccessible glens on the lofty Tasmanian mountains, descending at night to ravage the flocks and poultry-yards, until war was declared against them, and they were almost exterminated.

When in picturesque Tasmania I used to hear the most extraordinary yarns about these wolves, and the feats of strength and daring attributed to them were equal to those of full-grown Bengal tigers. But the only one I ever saw alive was in the fine Melbourne menagerie.

Tasmanian Devils.— Even the worst tempered man is occasionally, say, after a good dinner, mild and placable. Not so the little black creature aptly named the Tasmanian Devil, whose all-night growl is varied only by its all day yell and snarl, and who, when captive, tries to bite everybody who approaches it.

With its misshapen body (two feet long over all), thick-set muzzle, and formidable teeth, the Tasmanian devil is more dreaded by dogs than the wolf though only half its size, and its bite is no joke, for it holds on like a badger with its crushing teeth. It is difficult to tell why it requires such formidable means of offence, feeding as it does on the flesh of harmless animals and dead fish, and having few enemies other than man, who easily secures it in traps set in lonely parts of the bush.

The devil's voracity and strength, in comparison with its size, is immense. A good authority on Tasmania says: "One of them, and by no means a large one, escaped not long ago from captivity (it was in the convict days!) and killed during the night fifty-four fowls, six geese, an albatross on the beach, and a cat. Having been re-captured, in what was considered a stout trap with a door constructed of iron bars as thick as a big lead-pencil, he made his escape by twisting these obstacles on one side, almost doubling them up with his powerful teeth. To give some idea of the strength of the animal, I may mention that the blacksmith who repaired the trap could not bend the bars back into their position without proper tools."

Platypus.— Amongst the extraordinary forms of Antipodean animal life, none surpass the platypus, humorously described by Sydney Smith as "a quadruped as big as a

cat, with the eyes, skin, and colour of a mole, and the bill and web-feet of a duck, puzzling Dr. Shaw and rendering the latter half of his life miserable, from his utter inability to determine whether it was a bird or a beast." So that the name *Ornithorhynchus paradoxus,* given to it by naturalists, is certainly appropriate to a creature that puzzled even so great an anatomist as Sir Richard Owen.

Stuffed specimens give but a poor idea of the graceful glistening platypus that revels in the still waters of rivers and lakes, and leisurely constructs a tunnel thirty feet long, one entrance below the surface, the other on the banks, ending in an oval grass-lined nest where the female deposits her two eggs, for this is the only known mammal that is oviparous. Dr. Bennett, an authority on the question, denies this, maintaining that the platypus produces its young in the ordinary way of mammals. But to complete the paradox, the young ones when hatched, are brought up on milk, which, it is said, the mother diffuses around her when floating to the surface of the water, her offspring sucking it up.

About twenty-four inches long, including the tail, the body of the platypus is clothed in beautiful glossy fur usually of an amber or dark brown color, somewhat resembling a mole's. Fill up the mole's spade-like fore feet with strong webbing for swimming, enlarge its tail, and provide, in place of a muzzle, a queer kind of beak expanded and flattened, covered with soft skin, and furnished, like a dog's snout, with delicate and highly sensitive nerves, add a spur (the use of which has not been determined) inside the male's hind leg, and you have a fair idea of the platypus or duck-bill.

For the sake of its skin, the platypus is mercilessly shot down or caught with baited hooks, and as thirty or forty skins are required to make a rug, these innocent animals are becoming scarce.

Their favourite haunts are the quiet parts of rivers — called "ponds" in Australia, "pools" elsewhere — where the leaves of plants cover the surface, and the shaded banks are good for their burrows.

Warily creeping to the margin of a Murray river affluent, I remained motionless while my black guide pointed out several dark objects with heads slightly raised in the pool below, while little rings in the water showed they were paddling about. An insect crept up my nose and I sneezed! In an instant, not a platypus was to be seen; but we kept perfectly quiet, and saw them again in about five minutes — five months it seemed to me! — a little way from where I had first observed them.

The platypus does not bear captivity well, even in its native land, its food being a kind of water-insect difficult to procure. So, as things are at present, it cannot be exported. Dr. Bennett kept a pair of young ones alive in Sydney for five weeks. They loved to dabble about in a dish filled with water and furnished with a tuft of grass. They slept a great deal, especially during the day. Their food consisted of bread soaked in water, of hard-boiled eggs, and meat chopped very fine.

Flying Foxes.— There is an old story of a sailor's aged mother, who upon listening to his ridiculous yarn about having seen one of Pharoah's chariot-wheels dug up from the bottom of the Red Sea, and to his genuine description of the flying-fish he had seen in the Atlantic, believed the *yarn*, and rejected the *true* story. The good old dame's scepticism would have been even greater had her son discoursed about flying foxes, though they are simply large frugiferous bats called kalongs by the Australian aborigines.

They resemble foxes in face, have small ears, but no nasal leaf such as vampires possess. They are covered with a fine and, apparently, clean orange-coloured fur; but, let the skin-collector beware, for it swarms with parasitic insects, and its fetid odour deters anybody but a black from even touching it, though it does not deter the native from devouring the flesh of the animal.

The stretch of wing of a flying-fox is about two feet, and, like all the bat tribe, it can hang all day by its hooked wings, folded over its body in such a manner as to look like a suspended leather bottle.

The branches of trees selected by flying foxes as sleeping places are often bent by the weight of their number. The foliage shrivels and dies, and long before one can see the tree one can scent the musky odor of the foxes and hear their sharp cries as they squabble for places to hang from.

In orchards and gardens flying foxes are a great nuisance, devouring quantities of fruit and spoiling the rest by a simple touch of their wings as they flit among the branches, tainting the apricots and peaches, and rendering them unfit for market.

Flying foxes abound throughout Australia, but are scarce in Tasmania, which is unaccountable, it being the land of orchards. It is said that not many years ago flying foxes could be seen constantly in the Sydney Botanical Gardens; but their visits to the city are now periodical. I recollect that during a prolonged drought (and most likely as a result of it) the suburbs were besieged by them, and every orchard denuded of fruit. Our garden suffered like the rest, until having consumed all they could get, the flying foxes vanished as suddenly and mysteriously as they came.

AN ORPHAN BEAR.

BY

ERNEST THOMPSON-SETON.

HE was born over a score of years ago, away up in the wildest part of the wild West, on the head of the Little Piney, above where the Palette Ranch is now.

His Mother was just an ordinary Silvertip, living the quiet life that all Bears prefer, minding her own business and doing her duty by her family, asking no favors of any one excepting to let her alone.

It was July before she took her remarkable family down the Little Piney to the Graybull, and showed them what strawberries were, and where to find them.

Notwithstanding their Mother's deep conviction, the cubs were not remarkably big or bright; yet they were a remarkable family, for there were four of them, and it is not often a Grizzly Mother can boast of more than two.

The woolly-coated little creatures were having a fine time, and reveled in the lovely mountain summer and the abundance of good things. Their Mother turned over each log and flat stone they came to, and the moment it was lifted they all rushed under it like a lot of little pigs to lick up the ants and grubs there hidden.

It never once occurred to them that Mammy's strength might fail sometime, and let the great rock drop just as they got under it; nor would any one have thought so that might have chanced to see that huge arm and that shoulder sliding about under the great yellow robe she wore. No, no; that arm could never fail. The little ones were quite right. So they hustled and tumbled one another at each fresh log in their haste to be first, and squealed little squeals, and growled little growls, as if each was a pig, a pup, and a kitten all rolled into one.

From "The Biography of a Grizzly," by Ernest Thompson-Seton. Copyright 1899-1900 by The Century Co., and copyright 1900 by Ernest Thompson-Seton. By permission.

They were well acquainted with the common little brown ants that harbor under logs in the uplands, but now they came for the first time on one of the hills of the great, fat, luscious Wood-ant, and they all crowded around to lick up those that ran out. But they soon found that they were licking up more cactus-prickles and sand than ants, till their Mother said in Grizzly, " Let me show you how."

She knocked off the top of the hill, then laid her great paw flat on it for a few moments, and as the angry ants swarmed on to it she licked them up with one lick, and got a good rich mouthful to crunch, without a grain of sand or a cactus-stinger in it. The cubs soon learned. Each put up both his little brown paws, so that there was a ring of paws all around the ant-hill, and there they sat, like children playing ' hands,' and each licked first the right and then the left paw, or one cuffed his brother's ears for licking a paw that was not his own, till the ant-hill was cleared out and they were ready for a change.

Ants are sour food and made the Bears thirsty, so the old one led down to the river. After they had drunk as much as they wanted, and dabbled their feet, they walked down the bank to a pool, where the old one's keen eye caught sight of a number of Buffalo-fish basking on the bottom. The water was very low, mere pebbly rapids between these deep holes, so Mammy said to the little ones:

" Now you all sit there on the bank and learn something new."

First she went to the lower end of the pool and stirred up a cloud of mud which hung in the still water, and sent a long tail floating like a curtain over the rapids just below. Then she went quietly round by land, and sprang into the upper end of pool with all the noise she could. The fish had crowded to that end, but this sudden attack sent them off in a panic, and they dashed blindly into the mudcloud. Out of fifty fish there is always a good chance of some being fools, and half a dozen of these dashed through the darkened water into the cur-

rent, and before they knew it they were struggling over the shingly shallow. The old Grizzly jerked them out to the bank, and the little ones rushed noisily on these funny, short snakes that could not get away, and gobbled and gorged till their little bellies looked like balloons.

They had eaten so much now, and the sun was so hot, that all were quite sleepy. So the Mother-bear led them to a quiet little nook, and as soon as she lay down, though they were puffing with heat, they all snuggled around her and went to sleep, with their little brown paws curled in, and their little black noses tucked into their wool as though it were a very cold day. After an hour or two they began to yawn and stretch themselves, except little Fuzz, the smallest; she poked out her sharp nose for a moment, then snuggled back between her Mother's great arms, for she was a gentle, petted little thing. The largest, the one afterward known as Wahb, sprawled over on his back and began to worry a root that stuck up, grumbling to himself as he chewed it, or slapped it with his paw for not staying where he wanted it. Presently Mooney, the mischief, began tugging at Frizzle's ears, and got his own well boxed. They clenched for a tussle; then, locked in a tight, little grizzly yellow ball, they sprawled over and over on the grass, and, before they knew it, down a bank, and away out of sight toward the river.

Almost immediately there was an outcry of yells for help from the little wrestlers. There could be no mistaking the real terror in their voices. Some dreadful danger was threatening.

Up jumped the gentle Mother, changed into a perfect demon, and over the bank in time to see a hugh Range-bull make a deadly charge at what he doubtless took for a yellow dog. In a moment all would have been over with Frizzle, for he had missed his footing on the bank; but there was a thumping of heavy feet, a roar that startled even the great Bull, and, like a huge bounding ball of yellow fur, Mother Grizzly was upon him. Him! the monarch of the herd, the master of all these plains,

what had he to fear? He bellowed his deep war-cry, and charged to pin the old one to the bank; but as he bent to tear her with his shining horns, she dealt him a stunning blow, and before he could recover she was on his shoulders, raking the flesh from his ribs with sweep after sweep of her terrific claws.

The Bull roared with rage, and plunged and reared, dragging Mother Grizzly with him; then, as he hurled heavily off the slope, she let go to save herself, and the Bull rolled down into the river.

This was a lucky thing for him, for the Grizzly did not want to follow him there; so he waded out on the other side, and bellowing with fury and pain, slunk off to join the herd to which he belonged.

Old Colonel Pickett, the cattle king, was out riding the range. The night before, he had seen the new moon descending over the white cone of Pickett's Peak.

"I saw the last moon over Frank's Peak, said he, and the luck was against me for a month; now I reckon it's my turn."

Next morning his luck began. A letter came from Washington granting his request that a post-office be established at his ranch, and contained the polite inquiry, "What name do you suggest for the new post-office?"

The Colonel took down his new rifle, a 45-90 repeater. "May as well," he said; "this is my month"; and he rode up the Graybull to see how the cattle were doing.

As he passed under the Rimrock Mountain he heard a far-away roaring as of Bulls fighting, but thought nothing of it till he rounded the point and saw on the flat below a lot of his cattle pawing the dust and bellowing as they always do when they smell the blood of one of their number. He soon saw that the great Bull, 'the boss of the bunch,' was covered with blood. His back and sides were torn as by a Mountain-lion, and his head was battered as by another Bull.

"Grizzly," growled the Colonel, for he knew the mountains. He quickly noted the general direction of the Bull's back trail, then rode toward a high bank that offered a view. This was across the gravelly ford of the

Graybull, near the mouth of the Piney. His horse splashed through the cold water and began jerkily to climb the other bank.

As soon as the rider's head rose above the bank his hand grabbed the rifle, for there in full sight were five Grizzly Bears, an old one and four cubs.

"Run for the woods," growled the Mother Grizzly, for she knew that men carried guns. Not that she feared for herself; but the idea of such things among her darlings was too horrible to think of. She set off to guide them to the timber-tangle on the Lower Piney. But an awful, murderous fusillade began.

Bang! and Mother Grizzly felt a deadly pang.

Bang! and poor little Fuzz rolled over with a scream of pain and lay still.

With a roar of hate and fury Mother Grizzly turned to attack the enemy.

Bang! and she fell paralyzed and dying with a high shoulder shot. And the three little cubs, not knowing what to do, ran back to their Mother.

Bang! bang! and Mooney and Frizzle sank in dying agonies beside her, and Wahb, terrified and stupefied, ran in a circle about them. Then, hardly knowing why, he turned and dashed into the timber-tangle, and disappeared as a last *bang* left him with a stinging pain and a useless, broken hind paw.

That is why the post-office was called Four-Bears. The Colonel seemed pleased with what he had done; indeed, he told of it himself.

But away up in the woods of Anderson's Peak that night a little lame Grizzly might have been seen wandering, limping along, leaving a bloody spot each time he tried to set down his hind paw; whining and whimpering, "Mother! Mother! Oh, Mother, where are you?" for he was cold and hungry, and had such a pain in his foot. But there was no Mother to come to him, and he dared not go back where he had left her, so he wandered aimlessly about among the pines.

Then he smelled some strange animal smell and heard heavy footsteps; and not knowing what else to do, he

climbed a tree. Presently a band of great, long-necked, slim-legged animals, taller than his Mother, came by under the tree. He had seen such once before and had not been afraid of them then, because he had been with his Mother. But now he kept very quiet in the tree, and the big creatures stopped picking the grass when they were near him, and blowing their noses, ran out of sight.

He stayed in the tree till near morning, and then he was so stiff with cold that he could scarcely get down. But the warm sun came up, and he felt better as he sought about for berries and ants, for he was very hungry. Then he went back to the Piney and put his wounded foot in the ice-cold water.

He wanted to get back to the mountains again, but still he felt he must go to where he had left his Mother and brothers. When the afternoon grew warm, he went limping down the stream through the timber, and down the banks of the Graybull till he came to the place where yesterday they had the fish-feast; and he eagerly crunched the heads and remains that he found. But there was an odd and horrid smell on the wind. It frightened him, and as he went down to where he last had seen his Mother the smell grew worse. He peeped out cautiously at the place, and saw there a lot of Coyotes, tearing at something. What it was he did not know; but he saw no Mother, and the smell that sickened and terrified him was worse than ever, so he quickly turned back toward the timber-tangle of the Lower Piney, and nevermore came back to look for his lost family. He wanted his Mother as much as ever, but something told him it was no use.

As cold night came down, he missed her more and more again, and he whimpered as he limped along, a miserable, lonely, little, motherless Bear — not lost in the mountains, for he had no home to seek, but so sick and lonely, and with such a pain in his foot, and in his stomach a craving for the drink that would nevermore be his. That night he found a hollow log, and crawling in, he tried to dream that his Mother's great, furry arms were around him, and he snuffled himself to sleep.

MENTAL CAPACITY OF ANIMALS.

BY

WILLIAM T. HORNADAY.

Director of the New York Zoological Park.

OUT of the depths of his egotism, man occasionally evolves the conception that he is the only animal that can think and carry thought beyond one decimal place. With precisely the same bones in his skeleton as a chimpanzee, he sometimes flatters himself into the belief that somehow his gray-matter is different, and that the animals below him cannot "reason," as he sometimes does.

The question, "Do animals reason?" is nearly as idle and frivolous as it would be to ask "Do fishes swim?" Of course animals reason; and it is only the man who does not know them intimately who will hold that they do not. Ask the animal-trainers, trappers, hunters and keepers, and to the last man they will say: "Of course animals reason." And these, mind you, are the men who win their bread because they can accurately gauge the mental processes of the animals with which they have to deal. Take an illustration:

My guide in British Columbia, Charles L. Smith, is by winter business a trapper; and for twenty years he has backed his reasoning powers against those of that creature of diabolical cunning and originality, the wolverene. Rarely is a wolverene caught in a trap. Once, however, in attempting to figure out wolverine reasoning, Charlie put a quarter of venison in his cabin, left the door ajar, and planted two traps in the opening. He said: "The wolverine will carefully avoid those traps and stay out. Behind my cabin I will carelessly hang up in this tree the deer's head, as if I had thrown it into the discard. Wolverene will say: 'Aha! This fellow has forgotten

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to look out for this head. I will pull it down and drag it off.' ''

So in the spot where *Gulo luscus* would need to stand in carrying out that shrewd intention, the trapper planted a trap, attached to a pole like a well-sweep. Result: *Gulo* reasoned precisely as the trapper thought he would. He carefully avoided the traps in the doorway, went boldly to the forgotten (?) head, was caught, snatched high in air by the balanced pole, and when the trapper returned from his line he found his implacable enemy hanging high, and '' dead as a wedge.''

Animals reason, just as men do, much or little, according to what they are and where they are. In these days a fox, a deer, bear or lynx could not live a week if it did not reason hard from dawn till dark. A fox that goes out hunting ruffed grouse reasons just as clearly and as cogently as his human rival who hunts both. Like men of different kinds, the mind of an animal may contain only a score of distinct and recognizable ideas, or it may be a hundred. As long as it remains under the same conditions that surrounded its parents, its thoughts will run in the same grooves that theirs did. But remove the parents, change those conditions, and, presto! that animal develops new lines of thought and draws an entirely new set of conclusions.

The idea that animals know only what their parents have taught them in the forest kindergarten is the most arrant nonsense ever penned, as any child of reasoning age can easily prove. If this childish notion was true, all young animals deprived of their parents before they are regularly weaned would starve to death.

Catch any adult animal in a trap, unhurt, and you will soon see it develop new lines of reasoning from premise to conclusion. A bear, a puma, wolf or wolverene will say: '' This cage is of wood and black bars. The bars are small; I will bite them in two. . . . No, they are harder than my teeth. I will pull them out, one by one, with my teeth and claws. . . . No, they will not come out. But wood is softer than iron. I will eat my way

out through the wood. I can get out easier at a weak place than a strong one. This crack in the middle of the side is a weak spot, and with my claws I can tear off splinters from the edges.'' And to work he goes, with knowledge deduced from straight reasoning, to chew and tear his way out, chip by chip, by a process he never before had seen or dreamed of.

The mental faculties of the higher animals are precisely the same as those of men, and they result in the same series of emotions. The state of the body — warm or cold, hungry or fed, safe or in peril, in peace or at war, bond or free — leads to a corresponding series of emotions and mental activities. From elephants down to mice, and from chimpanzee to echidna, the four-footed and four-handed animals manifest love and hate, courage and fear, hope and despondency, joy and grief, pleasure and pain, content and nostalgia, memory and forgetfulness, faithfulness and treachery, mercy and cruelty, forgiveness and revenge. It would require a volume to contain the illustrations of these emotions that now come crowding to my mind.

It is wholly according to their reasoning powers that horses are safe or dangerous. A fine young mare which I know is a confirmed pessimist — always predicting calamity, always expecting trouble, always ready to fly off at a tangent and smash things. But our '' Major '' is such a confirmed optimist that he believes nothing ever will harm him. He fears neither automobile, engine nor artillery in action. If a road was open he would willingly be driven into the engine-room of a man-of-war. A good horse, when properly driven, has perfect confidence in its driver, but the equine pessimist has none.

In ability to reason from cause to effect, under entirely new conditions, I think the Indian elephant is one of the wisest of all the lower animals. Of all the dangerous animals ever captured when fully adult, the elephant is the only one which promptly learns that the mind of man is superior to brute force, that its wisest course is to accept captivity philosophically, that it pays to be good,

and that a cheerful spirit promotes peace of mind and longevity. This is the most striking, and also universal, instance of clear reasoning that I have ever observed among wild beasts.

A lion, tiger, bear, bison, elk, orang or chimpanzee, when captured alive and fully grown, is wise and shrewd in fighting its way to freedom, but when beaten it reasons no further. It does not know enough to cease to fight its bonds and its bondsmen, and as a rule it lives only when it cannot possibly die of broken bones or a broken heart.

How different is *Elephas indicus*. An elephant is caught wild and fully adult, mastered in about two weeks' time, or even less, and in from six to twelve weeks is actually broken, or trained to steady service in the timber forests.

Six weeks after its capture, an adult orang is still a raging demon, and usually in from three to five months it is dead, of sheer intractability. An adult bear lives longer, for several years, perhaps; because it is of coarser, tougher fiber and stronger appetite, and is unable to die. But do not think for one moment of training and handling large carnivores, caught when adult, for their rage and choler leave no opportunity for calm ratiocination.

Not only is the Indian elephant one of the best original reasoners in the kingdom of lower animals, but as far as I can judge, it also has the best memory. A particularly intelligent chimpanzee can remember as many different things as an elephant, but out of the whole number of captive chimpanzees not more than one-fourth or one-fifth can be taught and made to remember the number of things that can easily be learned and actually remembered by every Indian elephant. The wonderful things about an elephant's memory are its scope, accuracy and quickness. In these three qualities of mind, and also in susceptibility to training, I think that the Indian elephant stands at the head of all the animals below man.

The mental capacity, and especially the memory of elephants, is best shown in the circus ring, where the

whole performance depends upon the ear, the memory, the eye and the words of the trainer. The most striking manifestations of intelligence are the accuracy of the elephantine memory and the absence of lapses, the promptness of response, and the great number of things remembered. Among trained lions, horses and dogs it is only the exceptionally apt animals that reach the exhibition platform, but with elephants everyone is a "star."

In the show performances of elephants, there are two leading features. The most spectacular is the military drill, in which from ten to twenty elephants go through a series of evolutions, from "fall in," "roll-call," and several kinds of marching and countermarching to the final "ground arms," when all lie prone upon the earth. Before me I have a list of fifteen commands that were obeyed instantly, accurately and without hesitation or mistake by sixteen elephants. Not one command was repeated, and not one elephant made an error. It was a long and complex performance, much too long, I think, for any animal to remember from beginning to end without spoken commands.

The other elephant-act usually consists of "trick elephants," which do almost everything their trainer can think of. I have seen elephants taken from the drill and its fifteen acts, and as trick-animals put through a series of eighteen more, making thirty-three acts in all for each animal to remember. Is there any other animal which ever has been so trained, or which ever has exhibited so wonderful a combination of perceptive faculties, memory and philosophical obedience? I think not. In my judgment, lions, tigers, dogs, monkeys and horses are not even in the same class, mentally, as elephants.

In the timber camps of Southern India every elephant is trained as a matter of ordinary routine to do at least sixteen different things by command, and in their work they show more intelligence than some human beings.

A young friend in the forest department of Burma, A. E. Ross, relates a striking case of long memory in a working elephant. Among the grass-cutters who sup-

plied a force of working elephants with green food, there was one who had incurred the pronounced dislike of one of the animals. Before matters reached a crisis, however, the grass-cutter was sent some distance away to work in another camp.

About a year later the man came back and quietly drifted into the ranks of his fellows, fully believing that during his absence the elephant had forgotten him. But not so. At the first assembly of elephants and men, the elephant espied his old enemy in the ranks of the grass-cutters and instantly charged him. The man fled for his life, and never dared to return.

To my mind, there is no more effective test of a wild animal's reasoning powers than its course when ill or wounded. I have seen wounded buffaloes leave the herd without an instant's delay, turn off sharply to one side and seek immediate concealment in a ravine. While a broken leg is healing, a buffalo will work its way into the head of the most rugged ravine it can find, where the cut banks are highest and men most seldom come. But when well and strong, the same animal feeds well afield, where it can see far and wide and gain a long start from every approaching horseman.

Of all wild animals in captivity, apes and monkeys most quickly learn that a sick monkey needs a doctor. But not all do this, however; in fact, none but the brightest.

One of the most amusing performances I ever saw in which primates were the actors was a ring-tailed monkey showing to three other monkeys a cavity in one of the molars of a bonneted monkey, and telling them all about it. The bonneted monkey sat quietly, opened its mouth wide and held still for at least a minute. The ring-tailed monkey peered in, discovered the defective molar, with its left hand pushed down the lower lip, dentist-fashion, and put its right forefinger on the tooth, while it solemnly explained the situation. The other monkeys crowded around, wrinkled their brows and solemnly peered into the open mouth to see the cavity that needed filling.

Through their extra-close and human-like daily asso-

ciation with the men who care for them, apes quickly learn that in sickness or trouble they need human help. So quickly do they learn (some of them, at least) that it is safe and wise to swallow anything that a friend offers in a spoon, they even accept and swallow medicines that do not taste good. To me, this is evidence of sound reasoning; for from wild men to wild mice the first law of nature is that whatever does not taste good is not good to swallow. Of wild animals generally, about ninety-nine out of every hundred will fight the doctor, at least during first treatment. Through experience, however, they do sometimes learn that when ill it is good to be doctored.

Last June we helped our fine Altai wapiti doe out of serious trouble, holding her by main strength during the operation. At that time I had a strong impression that she realized we were doing our best to help her. Afterward she became tame. In September, when I was absent, she was badly gored by her mate, and for a time her life hung by a thread. Said Keeper John Quinn in October: "And I tell ye, sir, we couldn't a saved her nohow if she hadn't been so sensible and kept so quiet and let us treat them wounds twice every day. She really knew what we was a doin' for her. Now she's all right."

Nearly every intelligent chimpanzee and orang-utan quickly learns what it means to have human help when in trouble, and the assistance they sometimes render the doctor is of great value. In the treatment of abscesses, they submit to the knife voluntarily and without restraint in a way that is astonishing. Our Soko was at first an active, nervous and almost uncontrollable chimpanzee, possessed of remarkable strength. When an abscess developed on her jaw, we dreaded the struggle that seemed impending in order to use the lance. On the day previous to that fixed for the operation, Dr. Blair stood in front of her cage, studying the situation. Soko came forward, close to the bars, and pressed her face against them. The doctor reached forward and began to feel the abscess; and Soko turned that side of her face to give

him the best opportunity. Finding that she not only did not flinch but seemed anxious to have something done, he whipped out his knife and successfully opened and discharged the abscess, through the grating, while the animal resolutely held her afflicted jaw motionless against the bars. She accepted the cut as if she liked it. Since that time she has voluntarily submitted to two similar operations and all the after treatment they involved.

In the first year of the Zoölogical Park, before we had a veterinary surgeon, I saved the life of a baby orang-utan by two operations of half an hour each, solely by reason of the fact that the absurd little creature assisted me throughout intelligently and earnestly.

Reason is an appreciation of the fact that particular conditions and results are produced by specific causes. Two animals do not fight unless one reasons that it can vanquish the other. To-day there are savages in both the Old World and the New whose reasoning powers are not so good as those of the little chief hare, which knows enough to house itself comfortably where its enemies cannot get at it, and to pack away enough food to last throughout the long winter.

Some species of animals are mentally higher than others, just as some races of men are, and some are keener than others in the line of original thought. There are millions of men who know only to do as they have seen other men do. The mechanical men who are given to original reasoning we call inventors. The animal world also contains its share of inventors. Of course it is true that not every animal possesses all the mental attributes; and there are plenty of men and women of whom the same may be said.

I once asked Carl Hagenbeck, who has turned out of his great animal park at Hamburg many magnificent groups of trained animals, this question: "In general mental capacity and susceptibility to training how do the lion, tiger, leopard, jaguar and puma stand in relation to each other?"

In his reply he placed the lion and tiger in a separate

and superior class, and the other three species in another, of less intelligence and tractability. He said, in substance: "The lion and tiger are alike in good temper and reliability. The leopard, jaguar and puma are also equal in character, but are not so good as the other two. As to the intelligence of these five animals, the one [species] is as intelligent as the other, but with these animals it is just the same as with human beings: some learn quickly, others are stupid and give much trouble in training. For example, take the two lions and one tiger which my trainer has recently educated for his large group. In one month he trained one of the lions to do very difficult tricks, and in five weeks the tiger learned to do all the tricks of the other animals in the group. The other lion was no good at all. Although a fine beast to look at, it was nervous and stupid."

Regarding the comparative intelligence of animals, opinions differ, according to conditions. All the Western trappers whom I know regard the wolverene as the wisest and most resourceful of all animals, as well as the greatest robber, murderer and all-round degenerate. The trainers of chimpanzees and orangs will assure you that those apes are intellectually the foremost of all animals below man.

The educator of Hans, the phenomenal horse, has the best of reasons for giving the horse first place. Andrew Glass vows that his late cinnamon-bear was the animal whose intelligence was nearest to his own. As for myself, I accord first place to the elephant. In two days Keeper Gleason trained our Indian elephant Gunda to take pennies in his trunk, lift the lid of a small box high above his head, drop the pennies into it and ring a bell. We have had some intelligent apes, but never an orang or "chimp" which learned an act of that difficulty in less than a week.

Beyond doubt there are in store many novelties and surprises for those who study and develop the mental faculties of the higher vertebrates. Twenty years ago who was there who suspected the wonderful mental capa-

bilities of the barking sea-lion? All studies and experiments in the field of animal psychology should have for their foundation the full and complete admission that all the higher animals do reason, and that between them and man the mental differences are in degree only, not in kind.

ANIMAL CONSCIENCE.

From "The Spectator," London.

THAT a moral sense may exist in animals we think no one who has ever kept dogs will deny. It is not easy to compare it, however, with the moral sense as it exists in men. If we set a dog's conscience beside a man's, the first thing we shall notice is that the former is upside down. To avoid violence and deceit, and to distinguish between his own property and someone's else are the ideas which form the foundation of the moral character of an average civilized man.

Standing on this foundation we find in greater or less degree the higher virtues — sympathy, loyalty, self-sacrifice, resignation; all those things, in short, which may be roughly summed up in the word "self-devotion."

Now all these fine qualities form the basis of the moral character of a good and civilized dog. Upon this basis some of the plainer virtues may be superimposed; but unless supported by discipline, the upper part of the edifice is never very steady. The truth is that dogs have no abstract sense of right and wrong, but they have, in addition to a high degree of intelligence, which teaches them to avoid pain by virtuous practice, a faculty analogous to the religious faculty in man.

They worship the higher race, apart from whose influence they have no conscience at all. Their minds in contact with the mind of man display at times an astonish-

ing amount of moral perception. Take the fact that the average dog undersands the nature of an accident. He makes allowance for motive. We have seen a sharp-tempered terrier very suspicious of strangers receive a severe blow, accidentally inflicted by some one he did not know, without showing any temper, and accept the careless person's apologies with the utmost graciousness. Had he suspected wanton cruelty, he would undoubtedly have resented it; and in the case of any injury inflicted by another dog he would not have considered the motive, but would have had instant recourse to violence to ease his feelings.

Nevertheless, all dogs will steal unless they fear punishment, or at least a show of displeasure. We have never heard of a dog who avoided stealing from other animals. They love to fight, and feel not the slightest remorse when they see their adversary lying dead before them. They take pleasure in killing any small, helpless thing below them in animal rank. Yet towards the children of the higher race their forbearance is endless. After any successful piece of deceit — travelling in railway trains when forbidden to go on a journey, or creeping behind hedges that they may accompany their masters upon a forbidden walk — they show signs of extraordinary contentment and pleasure.

On the other hand, a really clever and devoted dog will strain every mental faculty that he may enter into the mood of his master, and be able to show him sympathy and resign himself to his master's will, and, when his master's actions are dictated by temper or caprice, will forgive him till seventy times seven.

On the whole, dogs are of course highly courageous animals; but individuals among them have timid idiosyncrasies, which alone they seem unable to control; yet anxiety for the safety of a master or mistress will supply them with moral force to keep down physical fear. The present writer can vouch for the fact that a dog who all his life had exhibited an extreme and ridiculous terror of cattle, refusing to go through a field in which he could

see a few cows, and insisting on making long detours to avoid going near them, one day saw from a distance that his mistress was being chased by a cow, who finally knocked her down. He rushed to her aid, and by the time some laborers could get to the field the animal was not only driven off, but severely torn and injured. That dogs prefer to meet death with their masters rather than to save their lives alone is a fact too well known to need insisting on.

What would a dog be like who, having always lived among men, and possessing a highly trained intellect and a great natural predilection for the comforts of civilization and the luxuries of indoor life, disbelieved in man? Such dogs are rare, but the present writer is certain that he has known one. His life was a tragedy. Morals he had none. Yet even in him one saw the germ of a better nature, which might have developed if he could but have worshiped man, if the circumstances of his early youth had not rendered him a confirmed and cynical sceptic.

He was a rough-haired English terrier — if he was anything — with a constitutional tendency to be stout. He was very clever, and his comprehension of language seemed at times almost uncanny. So far as the present writer, who owned him during the last years of his life, could trace his history, he grew up in what is called a good position — that is, he belonged to a gentleman who lived in the country and had many servants. So far as it was possible to make out from the dog himself, even his earliest youth was not happy. The sight of a whip or the sound of a loud voice upset his nerves to the end. In early middle life he was given away to the butler. A dog given away into a different social rank is seldom very happy. The poor little fellow, chained in a kennel and roughly used in the house, was wretched. His distrust of men was confirmed. He had no pleasures except those of the palate.

After a year or two his circumstances changed again. He was made over to the writer, who pitied him. "'Pig' is his name, and it describes him," said the

THE COWS

AFTER THE PAINTING BY LOVERIDGE

The word cow is most interesting etymologically, because it is practically the same in all languages. In the ancient Sanscrit it is gô—and in all European languages the sound is the same, though the spelling differs slightly. But the word cattle is still more significant. It belongs to the same root as capital—because, in early ages, man's property consisted, for the most part, in the beasts he owned.

butler; and certainly in all his troubles, both mental and physical, " Piggie's " appetite never failed. It took him a year to understand that dogs going in or out of a door held open for them have no occasion to apprehend a kick. He learned at last to lose all fear of his human acquaintance, but he never cared much about any one of them.

In his new home he found a collie, who at first resented his intrusion; but " Piggie " acted a meek and unresentful part, so the big dog soon gave up bullying him, and the two became great friends. That is, " Piggie " gave to him all the devotion he could not give to man, and the collie returned him toleration. The friends were seldom apart, for " Piggie " could not bear the collie out of his sight. They played together, hunted together, basked together in the afternoon sun, and slept together in front of the hall fire. They had their meals at the same time, and the little dog, for all his devotion to his friend, could never refrain from making raids upon his dish, and invariably ended by eating most of his meat. The latter always growled most alarmingly, but they never came to blows.

The odd thing about " Piggie " was that he was not in the least jealous. The collie's attachment to his men and women friends gave him no uneasiness, and he could watch him receiving their caresses without a qualm. He knew, or thought he knew, human nature, and he believed it to be bad. He was pleased enough with any notice that came his way, but he always contrived to give an impression that he was not deceived by it. There could be no doubt that his friendship made him happy. His whole manner changed for the brighter when in the collie's presence. But he was for all that a bad companion for the object of his devotion. Civil, and even servile, to every member of the household he lived in, he occasionally bit insignificant strangers, such as errand boys, for no sort of reason. The complaints of the latter were at first entirely disbelieved in the face of " Piggie's " bland countenance and wagging tail. Also he took the larger

dog out poaching on dark afternoons, and taught him to jump out from behind a door or gate and startle nervous people by barking in a rude way.

It always seemed as if "Piggie" had something to do with the final exile of the collie, who, having got rather out of hand under "Piggie's" influence, expressed a dislike, which he had for a long time suppressed and kept within civil bounds, to a neighbor against whom he had a grudge. Like most collies, he could not forgive — and like many men, neither could the neighbor. The quarrel went too far to be patched up, and the less important of the parties concerned had to leave the parish.

When he went away — to an excellent home — his human friends sorrowed, but "Piggie" broke his heart. Never any more did he go barking forth to chase birds upon the lawn, nor hunt a rabbit in the adjoining field. He seldom moved ten yards outside the house, and never again showed the slightest interest in anything but his dinner. He simply moped and grew fat. Now and then someone would persuade him to go for a short walk. On one such occasion he was left for a few minutes outside a house, and took the opportunity to kill eleven ducks. It was thought that sorrow had begun to unhinge his mind.

One day a retriever came to replace the collie, and it was hoped that "Piggie" might be aroused from his apathy, and once more nourish his soul by friendship. He was roused, indeed, but only to a bitter hatred. If the new dog passed him, he would always snarl and generally snap. But retrievers are good-natured, and slow at the uptake; the new-comer refused every day to accept the challenge, backed away from the small white fury as a man might back from a bursting soda-water bottle, and for several months took no vengeance for many sharp bites. The family ceased to feel anxiety about a scene which never came to anything; and though the little dog lived chiefly in the house and the big one chiefly outside, they met at will. Suddenly one day the retriever turned, and poor little "Piggie," too fat to be

in a condition to fight, never recovered from his wounds. So he died out of mistaken loyalty. His whole life and character were ruined by misanthropy; and after all it was not his own fault.

THE COLORATION OF SOME ANIMALS.

BY

R. Lyddeker.

WHEN the meaning and purport of the coloration of mammals first began to receive careful attention on the part of naturalists, there was a tendency to classify brilliant markings like those of the African bushbucks, bongo, and kudus as "recognition markings"—that is to say, markings designed to enable all members of a species to recognise with facility their own kind. Animals have, however, other modes of mutual recognition in addition to colour; besides which different species, whether they go about in pairs, in small family parties, or in herds, keep, as a rule, more or less to themselves, and are in no danger of mistaking other species for their own kind.

Probably among the great majority of mammals the only "recognition marks" are the white or light-coloured areas on the tail or hindquarters, which are displayed to their fullest extent in many cases when the members of a party or herd have to "bolt" suddenly to cover. In some species, like the rabbit and the white-tailed American deer, the white area is restricted to the under-side of the tail and the adjacent portions, and in such cases the tail is always raised when in flight, so as to expose a large and conspicuous blaze of white. In other species, such as the Japanese deer and its relatives of the Asiatic mainland, or the roe, the white area takes

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the form of a patch of long hairs on the same parts, which are erected and expanded when the animals are alarmed. Probably the straw-coloured patch of the wapiti and red-deer is of the same nature, but as these animals are less likely to miss their leader when in flight than is the case with smaller species, the "recognition mark" is less conspicuous.

In regard to spotted deer and striped antelopes, it seems probable, as has been suggested by Mr. R. I. Pocock, that the white markings belong to two different categories so far as their purpose is concerned. In many of such animals not only is the under-surface of the body white, but there are several white gorgets on the throat and white spots on the side of the face and chin. Now there can be little doubt that such white areas are for the purpose of counteracting the dark shade thrown by the body, and thus rendering the animal much less conspicuous when seen at a distance than would otherwise be the case. That this is the true explanation is rendered practically certain by the circumstance that such white markings, especially the gorgets on the throat, persist in species which, like the Indian nilgai and the American prongbuck, have lost the ancestral stripes and spots. In neither of the two species referred to, it may be well to observe, are the young spotted or striped, and it is therefore only from analogy that we speak of their ancestors being thus colored; but the nilgai is so closely related to the bushbucks and kudus that there can be little doubt that the assertion is justifiable. Even, however, if it were not so, the case as regards the purport of the white gorgets and under-parts remains unaltered. It may be added that such white patches can only be effectual where there is plenty of light to throw the shadow; and this is in accordance with the fact that kudu and chital inhabit less dense forest than sambar.

Having indicated, then, the special purpose of the white under-parts and throat-markings of deer and antelopes, we may consider the object of the stripes and spots characteristic of certain species and groups. All the

bushbucks, save the males of one or two species, together with their near relatives the bongo, the kudu, and the elands, are characterised, as a rule, by having the whole body marked by narrow white stripes, which are, for the most part, vertical (although in some cases they form a kind of network) upon a fawn or rufous ground. And these animals, as is attested by the large size of their ears, are chiefly dwellers in forest. Directly, however, any member of the group has left the forest for more open country, as in the case of the Cape eland and the Cape bushbuck, the stripes more or less gradually disappear. Further, those species which inhabit the densest forest have their colours the most brilliantly developed, as is well exemplified in the case of the lesser and the greater kudu, the former of which is more of a forest animal than the latter. One of the most brilliantly coloured of all is the bongo of the equatorial forests.

Clearly, then, narrow vertical white stripes on a fawn or chestnut ground, which we have reason to regard as a very primitive type of animal coloration, are connected with a forest life, and the presumption is that they are of a protective nature. Confirmation of this view — if confirmation be needed — is afforded by two animals belonging to widely different groups — namely, Grévy's zebra and the Somali giraffe. The former of these animals differs from all its kindred by its enormous and heavily fringed ears, and these proclaim it to be a dweller in brushwood or forest rather than in open plains, a supposition which receives definite confirmation by the photographs taken during Lord Delamere's East African journey. But Grévy's zebra likewise differs from all its kindred by the extreme narrowness of its stripes, white stripes alternating with black ones of the same width. Here, then, narrow white stripes are clearly an adaptation to a forest life. And we further learn, from contrast with the bushbucks, that when the ground-colour is fawn or rufous the intervals between the white stripes must be large, while in the case of a black ground such intervals are no greater than the width of the stripes.

Whether such modifications of the pattern according to the shade of the ground-colour produce the same effect in forest or brushwood, can be learnt only by actual observation, and here again we must look to the sportsman.

As regards the Somali giraffe, those who have had the opportunity of seeing Lord Delamere's photographs can scarcely fail to notice that the type of coloration differs markedly from that of the common species, while the animal itself appears to be found in much more jungly country than is the case with the former. In place of having a buff ground-color blotched with large irregular chocolate patches, the Somali giraffe is a liver-colored animal marked with a coarse network of fine white lines, the type of coloration coming very close to that of some of the smaller bushbucks. Clearly this coloring is an adaptation for a mode of life not very different from that of the bushbucks, whereas the coloration of the ordinary giraffe is suited to an animal dwelling in open plains dotted here and there with tall scattered trees. The two types of coloration are, in fact, precisely analogous to those of Grévy's zebra as compared with Burchell's zebra, the one being a dweller in brushwood and the other in open country. The Somali giraffe has not, however, acquired the broad ears of essentially forest animals like its cousin the okapi, and for a very sufficient reason. The brushwood amid which this giraffe is commonly found does not reach more than half-way up its neck, as is clearly shown in the photographs already alluded to, so that ears of ordinary size suffice for the creature's hearing.

The mention of the okapi recalls the fact that the coloration of the upper part of the legs and hindquarters takes the form of narrow black and white stripes, running, however, more horizontally than vertically, but evidently conforming to the characteristic forest type.

From the foregoing observations it seems evident that in Africa, and in that country alone (for there are no vertically striped ungulates in Asia), there are two distinct types of protective coloration, the one generally

associated with large ears, for animals frequenting forest or brushwood, and the other for those living in more open country. The forest type takes the form of white stripes, either upon a fawn or chestnut or upon a black ground (the dark intervals being broad in the former case and narrow in the latter), or of a white network upon a liver-coloured ground. On the other hand, in the plain type we have either an alternation of broad dark and light vertical stripes or dark blotches upon a buff ground. Both forms of the latter type have been definitely stated to render the animals in which they occur more or less inconspicuous at comparatively short distances. But, so far as I am aware, there are absolutely no observations to indicate the degree of invisibility in the wild state of the two modifications of the forest type. Probably, however, the alternations of dark and light vertical stripes harmonise with the vertical lines formed by stems of underwood and the spaces between them.

We also want to know whether either or both of these types of apparently protective coloration are for their special purpose as good as (or better than) a uniform coloration, or under what circumstances, if any, the latter is superior to the former. For, curiously enough, both the forest and the plain type of coloration appear to have been transformed, in some instances, into a uniformly colored coat. As regards the plain type, the now extinct quagga shows the partial loss of the stripes, which have completely disappeared from the wild asses of Northern Africa. Very remarkable is the circumstance that from a fully striped animal like the so-called Grant's zebra of Abyssinia there is a complete graduation to the typical Burchell's zebra of the Transvaal, in which the stripes have disappeared from the legs, and the dark stripes are intercalated with paler "shadow stripes." One step from this animal and we reach the quagga, which, be it noted, inhabited the same country as the uniformly colored Cape eland. Evidently in the Cape district both the forest and the plain types of striping were

unsuitable and tended to disappear. In the North African wild asses the disappearance of the striping is complete. Before we can attempt to explain this it is necessary to know whether a Grant's zebra and a wild ass are equally inconspicuous in their own particular habitats, and whether any difference in this respect would be noticeable if the one were transported to the habitat of the other.

An instance of the replacement of the forest type of striping by a uniform coat (otherwise than in the case of a desert-dwelling species) is afforded among the bushbucks by the males of the nyala, which have long, shaggy brown coats with but very indistinct traces of striping. Is this dark coat a better protection than the brilliantly striped one of the female, or is it assumed because the males have (on account of their horns) no longer any need of protection? On the other hand, it is due to the fact that the bucks keep more to the heart of the forest, and are more nocturnal than their partners?

Another phase of coloration for the development of which no satisfactory reason can be assigned, is presented by the males of certain ruminants, such as the Indian blackbuck, the white-eared kob, and Mrs. Gray's kob of the White Nile, and the banting, or wild ox, of Java. In all these four species (the first three of which are antelopes) the adult males exchange the foxy red coat of the younger members of their own sex and of the females at all ages for a sable livery relieved by larger or smaller white areas. Clearly this coloration, in place of being protective, renders the animals in which it occurs conspicuous. The only suggestion which seems at all reasonable is that it must either be a "warning color" or one adapted to attract females towards the leader of the herd. If it come under the former category, it has apparently been developed in order to deter other animals from attacking the leaders of the herd, on account of their prowess in fight. That such an immunity would be an advantage to the individuals in question cannot be doubted; and possibly it receives support from the circumstance referred to in the next paragraph.

Although both sexes of the banting carry horns, the females of the aforesaid three species of antelope are hornless. In certain species, such as the sable antelope of Africa and the gaur (the miscalled bison) of India, in which both sexes are horned, the adult females as well as the males have assumed a blackish coat; and, so far as it goes, this phase is in favour of the view that the acquisition of a sable livery by certain species is for the purpose of warning off foes, both sexes in the above instances having formidable weapons of offence and defence, and being thus perfectly capable of taking care of themselves.

Probably the black hue of the Asiatic buffaloes and of the typical race of their African relatives was originally developed in the same manner and for the same purpose as in the case of the sable antelope. It may, however, now have acquired a higher significance, and be connected with the general prevalence of blackness among large hoofed mammals, such as elephants, rhinoceroses, hippopotamuses, buffaloes, and, to a great extent, tapirs. Among such animals it will not fail to be noticed that in many instances both sexes are armed with either horns or tusks; and that where such weapons have been discarded the animals are sufficiently protected either by their huge bodily bulk or by the nature of their haunts. Although we have the testimony of many sportsmen as to the difficulty of seeing an Indian elephant, even at close quarters, when in thick covert, we have yet to learn whether the prevalence of a black or dark grey skin among so many of the larger mammals is or is not for the purpose of protection. But since large herds of animals thus colored are frequently to be met with in open country, it has probably been developed for some other purpose, although what this may be it is difficult even to conjecture.

Returning once more to deer, and taking first the case of the fallow-deer, which (with the exception of the dark race) is spotted in summer and uniformly colored in winter, there seems no doubt that the dappled summer

coat is for the purpose of harmonising with the checkered shade cast by the leafy boughs of the trees under which the animals are wont to repose. This harmony has doubtless been noticed by many of my readers, and is well expressed in the following passage from Dr. L. Robinson's "Wild Traits in Tame Animals," which refers to a scene in Greenwich Park:—

"The dappled fallow-deer were grazing among the chestnut-trees or lying down upon the soft grass. I sat down on a seat to watch them, determined, if possible, to learn something fresh from them before I moved from the spot. One could not help noticing how remarkably their mottled skins, angular outlines, and branching horns fitted them for concealment in the glades of the forest. Even here, where the surroundings were to a large extent artificial, every now and then the eye would suddenly chance upon a deer resting among the checkered shadows, which was so inconspicuous that it had previously escaped notice."

Assuming, then, that the object of the dappled coat is to harmonise with the splashes of sunlight and shade beneath forest trees in summer, it is perfectly obvious that in temperate latitudes such a type of coloration would be quite out of place in winter, when the forest trees have shed their leaves. Accordingly the fallow-deer exchanges its dappled summer livery for a uniform coat of fawn more in harmony with the sombre color prevalent in nature generally during the northern winter. A precisely similar change takes place in the Japanese deer and its relative, the Peking deer of Manchuria, both of which have bright chestnut coats dappled with large white spots in summer, while in winter they are clothed in somber brown. It is, moreover, noticeable that in the Peking deer the summer coat is exchanged for the winter dress comparatively early in the season — doubtless in correlation with the early advent of winter in its native habitat.

The Japanese and Peking deer have, however, a representative in the island of Formosa, which lies just on the

northern tropic. Now, this Formosan deer — or Formosan sika, as it is properly called — differs from its northern relatives by retaining its spots more or less distinctly throughout the winter — obviously in correlation with its southern domicile, where perpetual summer reigns.

But, as being probably descended from northern representatives of the group, the Formosan sika has not been able to get entirely rid of the change from a spotted to a uniformly colored coat. On the other hand, the chital, or spotted deer of India, which is essentially a tropical or subtropical form, is just as brilliantly colored and as fully spotted in winter as in summer.

Regarding the haunts of the chital, Dr. Blanford, in "The Fauna of British India — Mammals," writes as follows: —

"The especial habitat of this deer, perhaps the most beautiful in form and coloration of the whole family, is amongst bushes and trees near water and in bamboo jungle. . . . Many of its favourite haunts are in some of the most beautiful wild scenery of the Indian plains and lower hills, on the margins of rippling streams with their banks overgrown by lofty trees, or in the grassy glades that open out midst the exquisite foliage of bamboo clumps. Spotted deer are thoroughly gregarious, and associate at all times of the year in herds, sometimes of several hundreds. They are less nocturnal than sambar, and may be found feeding for three or four hours after sunrise, and again in the afternoon for an hour or two before sunset. They generally drink between eight and ten o'clock in the morning, the time varying with the season of the year, and repose during the day in deep shade."

From this account it is clear that the habits and haunts (allowing for the difference in foliage and scenery) of the chital are practically the same as those of the fallow-deer in summer. Both species frequent forest glades in large herds during the daytime, and seek repose under the shade of spreading trees. It may be added that an-

other species of spotted deer inhabiting the tropics — namely, the Philippine spotted deer — resembles the chital in retaining its dappled livery at all seasons.

From these facts it is safe to conclude that among the members of the deer tribe a white-spotted coat is a protective adaptation to a diurnal life among the glades of leafy woods. When such woods, as in the tropics, retain their foliage throughout the year, the deer likewise retain their spots. On the other hand, when, as in the northern temperate zone, the trees become bare and leafless in winter, the deer assume a dull-colored uniform livery in harmony with the somber conditions of their inanimate surroundings.

One other point in connection with the above-mentioned species of spotted deer deserves brief mention. All of them, whether spotted in summer only or throughout the year, have " recognition marks " on their hindquarters. In the fallow-deer and chital these take the form of a white under-surface to the tail and white on the adjacent portion against which it rests, while in the sikas there is a patch of extensile white hairs. When the tail is raised in flight, as is always the case, a large white " blaze " is displayed, which serves not only to indicate the direction in which to fly, but likewise as a danger signal to the entire herd. Evidently these strongly pronounced " recognition marks," which are not developed in nocturnal and thicket-haunting deer of the sambar type, are correlated with the habit of frequenting the outskirts of glades of forests during daylight in large herds.

The various races of the sambar which have exchanged the primitive spotted coloration of the chital for a dull brown and shaggy coat are proclaimed to be essentially animals of the thick forest by the large size of their ears, although this characteristic is more strongly marked in the larger than in the smaller races of the group. Dr. Blanford's account of the habits of the Indian sambar runs as follows: —

" This is the woodland deer of South-Eastern Asia generally, and is more widely and generally distributed

than any other species. . . . It comes out on the grass slopes when such exist, as in the Nilgiris and other hill-ranges, to graze, but always takes refuge in the woods. It is but rarely found associating in any numbers; both stags and hinds are often found singly, but small herds of four or five to a dozen in number are commonly met with. Its habits are nocturnal; it may be seen feeding in the morning and evening, but it grazes chiefly at night, and at that time often visits small patches of cultivation in the half-cleared tracts, returning for the day to wilder parts, and often ascending hills to make a lair in grass amongst trees, where it generally selects a spot well shaded from the sun's rays."

Contrasting this with the account given above of the mode of life of the chital, the reason of the color of the sambar will be apparent. It is essentially a deer of the thickets, nocturnal and more or less solitary in habits, and shunning the sunlit glades. Hence not only is the coat uniformly dusky brown, but the white "recognition marks," so useful in the case of the fallow-deer and the sikas, are entirely wanting.

As regards the change from a grey fawn-color in summer to a foxy red in winter exhibited by many kinds of deer — most markedly by the American white-tail and the European roe, and, in a somewhat less degree, by the red-deer — it seems to be certainly analogous to the change from a spotted to a uniform coat in the Japanese and fallow-deer, and must therefore be for the purpose of protection. *Prima facie,* it might have been thought that the winter dress would be red, since this tint would apparently harmonise well with the russet hue of fallen leaves and dead bracken. The tone of the summer dress is, however, very similar to the ground-color of the coat of the Peking and Japanese deer at the same season, although we have yet to learn why a uniformly red tint is more advantageous in the case of the roe and the white-tail than a spotted dress. Possibly it may be owing to the more open nature of the country frequented by these and other species in which this type of coloration prevails.

That the change in the roe, the red-deer, and the white-tailed deer from red in summer to grey in winter is analogous to the change from a spotted to a uniform coat in the Peking deer and the fallow-deer, is demonstrated not only by the nature of the color itself, but more emphatically by the circumstance that in tropical and sub-tropical countries red-coated deer, such as the Indian muntjac and swamp-deer, or barasingha, retain their color throughout the year. A similar condition is noticeable in the case of the small tropical representatives of the Virginian white-tailed deer, most or all of which do not change their color with the season. In the last-mentioned instance it appears, indeed, that the coat is brownish or greyish, instead of red; but it is quite clear that the change from a red summer coat to a grey winter dress in species like the white-tail and the roe is for the purpose of protection, and is correlated with the presence of foliage on the trees at the one season and its absence at the other. It may be added that the white-tail and the muntjac have the under-side of the tail and the inner surfaces of the adjacent parts white, and thus display a conspicuous patch when running to covert with the tail elevated. Somewhat curiously, the roe generally develops a white patch only when in the grey winter dress. . . .

In those animals whose fur is ornamented with dark or light markings, these markings generally take the form either of longitudinal or transverse bands, or of spots; the latter being frequently arranged in more or less distinctly defined longitudinal lines, but never in transverse bands. Moreover, these markings, especially in the case of stripes and bands, are generally most developed on the upper surface of the body, although spots may be equally present on both the upper and the lower surfaces of the body. Many mammals, again, whether they be spotted or whether they be striped, have their tails marked by dark rings on a light ground; but this feature is also present in others in which the color of the body is of a uniform tint. It must not, however, be supposed

that there is any sharply defined distinction between spotted and striped mammals, many of the civets, as well as some of the cats, having markings intermediate between true spots and stripes. Spots, again, are somewhat variable in configuration, some animals, like the hunting-leopard, having solid circular dark spots, while in others, such as the leopard and jaguar, they assume the form of dark rings enclosing a light center. In some cases, as in the giraffe, the spots are enlarged so as to form large and more or less quadrangular blotches.

A survey of a museum or a menagerie will likewise show that spots and stripes are by no means equally prevalent in all groups of mammals. In the apes, monkeys, marmosets, and lemurs, for instance, they never occur; and when these animals are diversely colored, the coloration takes the form of patches symmetrically disposed on the two sides of the body, but otherwise not following any very clearly defined mode of arrangement. Then, again, in the hoofed mammals, many species are more or less uniformly colored, although the zebras are notable instances of transversely striped animals, while the giraffe is an equally notable instance of the blotched type of coloration. Among the even-toed subdivision of this order it may be also noticed that while in the more specialised forms, such as wild cattle and sheep, the coloration is more or less uniform, many of the antelopes show white transverse stripes on a dark ground.

Dark transverse stripes are, however, known only in the case of the little zebra-antelope of western Africa, and the gnus; while, although a lateral dark flank-stripe is present in some antelopes, and in the gazelles, none of these animals have the whole body marked by longitudinal dark stripes. In the case of the deer it has been mentioned that certain species, like the fallow-deer and the Indian spotted deer, are marked with longitudinal rows of white spots at all ages; while in the case of other species it will be found that the young are similarly marked, whereas the adults are uniformly colored. A similar state of things occurs among wild pigs, and

also in the tapirs, from which we are naturally led to infer that in this group of mammals, at least, a spotted or striped type of coloration is the original or generalised condition, while a uniformly colored coat is an acquired or specialised feature. And the same holds good for other groups.

Turning to the carnivorous mammals, we find that in many families, more especially the cats, hyaenas, and civets, stripes and spots are far more generally present than a uniform coloration; although some groups, such as the bears, form a marked exception to this rule, the majority of the species being uniformly colored, while none are striped or spotted. In some species of the weasel family — notably the badgers — it may be also noticed that while the sides of the head are marked by longitudinal dark and light stripes, the remainder of the body is uniformly colored. And it may be mentioned here that many animals, such as donkeys and dun-colored horses, retain a longitudinal dark stripe down the back, frequently accompanied by dark transverse bars on the limbs, while a uniform coloration prevails elsewhere.

In the gnawing mammals, or rodents, although many species are uniformly colored, stripes and spots are prevalent; and a survey of the collection of these animals in a good museum will show that, whether the pattern take the form of stripes or of spots, the arrangement is invariably longitudinal and never transverse. Indeed, it may be observed that when spots are present, these are invariably light-colored on a darker ground. Although in many cases the longitudinal stripes occupy the whole or a considerable portion of the upper surface, in some of the squirrels they are reduced to a dark and light stripe, or even a single light stripe on each flank, this remarkable type of coloration recalling the " speculum " on the wing of a duck. . . .

Several attempts have been made to reduce the coloration of animals to some general law, and among these one of the most notable was published some years ago by Prof. Eimer, of Tübingen, who based his conclusions on

a comprehensive study of vertebrates in general. As the result of his investigations, this observer declared that the following laws might be laid down in regard to color-markings of animals in general. Firstly, the primitive type of coloration took the form of longitudinal stripes. Secondly, these stripes broke up into spots, retaining in many cases a more or less distinct longitudinal arrangement. Thirdly, the spots again coalesced, but this time into transverse stripes. And fourthly, all markings disappeared, so as to produce a uniform coloration of the whole coat. As a further development of this theory, it was added that the more specialised features were assumed in many cases more completely by the male than the female, while the primitive coloration often persists in the young. It was also stated that the primitive longitudinal stripes frequently persist on the middle of the back, and likewise on the crown and sides of the face, examples of the latter survival being shown by the head- and face stripes of many spotted cats, and the dark and light streaks on the side of the face of the badger.

If these laws be true, we should, *prima facie,* expect to find a large number of longitudinally striped forms among the lower members of the class; while those of intermediate grades of evolution would be spotted, and the higher types either transversely striped or uniformly colored. This, however, could only be the case, as a whole, if all the mammals formed one regularly ascending series; whereas, as a matter of fact, they form a number of diverging branches, each containing specialised and generalised forms. The inquiry is thus rendered one of extreme complexity, although there ought, if the theory were true in its entirety, to be a considerable number of longitudinally striped species among the lowest groups of all. Unfortunately, paleontology, from the nature of the case, can afford us no aid, which very materially adds to the difficulty. It may be added that in Prof. Eimer's scheme no distinction is drawn between light and dark markings — that is to say, between the total disappearance of pigment and an ultra-development

of the same — and it is obvious that this may be of such prime importance that these two types of coloration may have nothing whatever to do with one another. Nevertheless, we may provisionally consider light and dark stripes and light and dark spots as respectively equivalent to one another.

With regard to uniformly colored animals, there can be no question as to the truth of the theory, since the young of so many animals, such as lions, pumas, deer, pigs and tapirs show more or less distinct striped or spotted markings, which disappear more or less completely in the adult. The occurrence of bands on the legs and sometimes on the shoulders of mules and dun-colored horses, and likewise the presence of dark bars on the limbs of otherwise uniformly colored species of cats, like the Egyptian cat and the bay cat, are further proofs of the same law. Moreover, the fact that in the young of pigs — and, to a certain extent, those of tapirs — the markings take the form of longitudinal stripes, whereas in the more specialised deer, whether young or old, they are in the shape of spots arranged in more or less well-defined lines, is, so far as it goes, a confirmation of the theory that spots are newer than stripes. And the presence of transverse stripes in the still more highly specialised antelopes tends to support the derivation of this type of marking from spots, especially if it be remembered that the harnessed antelopes are partly spotted. Still, it must be borne in mind that these instances apply only to light markings, which, as already stated, may have a totally different origin from dark ones.

There are, however, apparently insuperable difficulties as regards longitudinal and transverse striping in mammals. In the first place, instead of finding a number of the more primitive marsupials, showing longitudinal stripes, we have in this group only the three-striped and single striped opossums thus marked, and in these the stripes are respectively reduced to the numbers indicated by their names. This, however, is not all, for the banded

ant-eater takes its name from the narrow transverse white stripes with which the back is marked; while the thylacine, which cannot in any sense be regarded as a specialised type, is similarly marked with broader dark stripes, neither of these animals having any trace of a longitudinal stripe down the back. The water-opossum, again, may be regarded as a transversely striped marsupial, although here the stripes are few in number and approximate in form to blotches. Although in the same order the dasyures are spotted with white, we have no black-spotted marsupial; and if such a type formed the transition between longitudinal and transverse stripes, surely some species showing such a type of coloration ought to have persisted.

Then, again, in the ungulates we have the zebra-antelopes, the gnus, and the zebras showing most strongly marked transverse dark stripes; but we have no dark-spotted forms in the whole order except the giraffes, while the only ones with dark longitudinal stripes are young pigs. And it would thus appear that, although all the animals above mentioned are highly specialised species, these transverse stripes and dark blotches must have originated *de novo* quite independently in each of the groups in question. Indeed, when we remember that the coloration of zebras, antelopes, and giraffes is generally of a protective nature — the stripes of the former rendering the animals invisible on sandy ground in moonlight, and, to a great extent, also in sunlight, while the blotches of the latter harmonise exactly with the checkered shade thrown by the mimosa-trees among which they feed — it is incredible that both types should have been evolved, according to a rigid rule, from animals marked by dark longitudinal stripes.

Another instance of the same nature is afforded by the cats, in most of which the coloration appears to be mainly of a protective nature, plain-colored species, like the puma and lion, having tawny coats harmonising with the sandy deserts which these animals often inhabit, while the vertical stripes of the tiger, although in some degree

resembling the perpendicular lights and shadows of a grass-jungle, are probably for the purpose of breaking up the outline of the body. The clouded markings of the marbled cat and clouded leopard assimilate with the boughs on which these species repose, and the spotted coat of the Indian desert-cat renders the creature almost invisible in stony deserts. To suppose that all such adaptations have been produced in the regular order required by the theory is as incredible as in the last case. There is, moreover, the circumstance that the young of the uniformly colored lion and puma are spotted, thus giving an instance of the direct passage from a spotted to a plain-colored form without the intervention of a transversely striped stage, precisely the same thing also occurring in the case of the deer. It should, however, be mentioned that lion cubs occasionally have their tails ringed like that of a tiger, instead of spotted in leopard-fashion; so that in this particular instance transverse stripes are intercalated between the spotted and the uniformly colored stages.

If we look for the most primitive mammals with longitudinal dark stripes over the greater part of the upper surface, such types being wanting in the marsupials, we shall find them in the striped mongooses of Madagascar. And as the civets and their allies are certainly the most generalised of existing carnivora (although the modern members of that order occupy a somewhat high position), this case tends, in a certain degree, to lend some support to the view that longitudinal dark stripes are an early type. The rarity of animals exhibiting this pattern over all their bodies, coupled with the frequent retention of a longitudinal dorsal stripe, are likewise in some degree confirmatory of the same view. With regard to the conspicuous black and white stripes on the cheeks of the badger, and throughout the head and body in the skunks, South African weasel, and Cape polecat, it may perhaps be argued, with some show of reason, that we have an old type of coloration. In the badger this type of coloration is restricted to the face, where it is evidently

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BUFFALOES

FROM A PHOTOGRAPH

The Buffalo (or the American Bison, to be more accurate) which has now practically ceased to exist in the wild state in this country, where formerly they were found in thousands, is one of the "uniformly colored animals," and its coloring, no doubt, had something to do with the interesting phenomena of "protection by coloring." The only change that takes place in the buffalo's coat, however, is that of thickening in the winter and becoming lighter in the summer.

retained to render the animal inconspicuous among the streaks of light and shadow as it peers out of its burrow. On the other hand, they may have been acquired for this special purpose. In the other forms, all of which are more or less evil-smelling creatures, a conspicuous general coloration is an advantage, as warning off other animals from attacking them in mistake for harmless kinds, and the boldly alternating stripes have accordingly been retained all over the body and rendered as conspicuous as possible.

HOW ARCTIC ANIMALS TURN WHITE.

BY

R. LYDDEKER.

ALTHOUGH I have not the details of any one particular case before me, so many instances are chronicled in which the hair of human beings, under the influence of strong mental emotion due to terror or grief, has become suddenly blanched within a single night or some such period of time, that the occasional occurrence of such a phenomenon must apparently be accepted as a fact. Such a change is, of course, due to the bleaching of the pigment with which the hair is colored, although we need not stop to inquire by what particular means this bleaching is accomplished; all that concerns us on the present occasion being to know that the hair in man may turn white in this manner under abnormal circumstances. And there appears to be evidence that under equally abnormal conditions a similar change may take place suddenly in the hair of the lower animals. This is exemplified by the well-known experiment made considerably more than half a century ago by

From "Mostly Mammals." Zoological Essays. London.

Sir John Richardson on an Arctic lemming — a small mouse-like rodent, which habitually turns white in winter, although dark-colored in summer. In this instance the little animal was kept in a comparatively warm room till winter was well advanced, when it was suddenly exposed to a lower temperature. In consequence of the conditions under which it had been kept, this lemming was still brown in midwinter, when it ought to have been white. As the result of its first night's exposure, the fur on the cheeks and a patch on each shoulder became completely white, and by the end of the first week the whole coat had turned white. On examination it was found that only the tips of some of the hairs had become blanched, and that these white-tipped hairs were longer than the rest of the coat, apparently owing to a sudden growth on their part in the course of the experiment. By clipping these long white-tipped hairs the animal was restored to its original brown condition.

Nothing is said with regard to any change of coat on the part of this lemming previous to the experiment, but it is probable that none occurred. It seems, however, to be clearly demonstrated that the tips of the hairs lost their color by bleaching, induced by sudden exposure to the cold, and that the hairs thus blanched increased considerably in length in a very short period.

In spite of the very obvious fact that these changes occurred under abnormal circumstances, it has been argued that Arctic mammals which turn white in winter do so normally by a similar blanching of the hair of the summer coat, and that the greater length of the winter, as compared with the summer dress of such white animals, is due to a lengthening of the individual hairs of the former. Moreover, it has been inferred that the color-change is directly under the control of the animals themselves. Quite apart from many other considerations, one weak point in this argument is that the hairs in the subject of the experiment were white only at their tips. It was doubtless assumed that, had the experiment been extended over a longer period, the white would

have gradually extended downwards till the whole hair became blanched. But had this been the normal way in which the change from a black to a white coat is brought about, it is obvious that animals ought frequently to be captured in which the coat is in the same condition as that of the lemming. So far, however, as I am aware, no such condition has even been described.

Moreover, it is perfectly well known that, apart from those which turn white in winter, a large number of animals have a winter coat differing markedly in color, as well as in length, from the summer dress. The roebuck, for instance, is of a brilliant foxy red in summer, while in winter it is grey-fawn with a large patch of pure white on the buttocks. And it is quite clear that the change from red to grey, and the development of the white patch behind, is due to the shedding of the short summer coat and its replacement by the longer winter dress. Obviously, therefore, it is natural to expect that a similar change of coat takes place in the case of mammals which turn white in winter.

That the change in spring from a white to a dark dress is due to a shedding of the fur seems to be admitted on all hands, for it would obviously be quite impossible for long hairs to become short, or for white ones to turn brown. And even in animals which do not alter their color in any very marked degree according to season, the spring change of coat is sufficiently obvious. For the winter coat, owing to the long time it is carried and the inclemency of the season when it is in use, becomes much faded and worn by the time spring comes, and the contrast between it and the fresh and brilliant summer coat is very striking indeed. On the other hand, the summer coat is only donned for a comparatively short season, and that at a time of year when it does not become much damaged by the effects of the weather. Consequently no marked change is noticeable as the long winter hairs grow up through it, and it has accordingly become a common article of belief that, whether there is a change of color or not, the long winter coat is produced by a lengthening of the summer dress.

Apart from the evidence of animals like the roebuck and many other deer as to the existence of an autumn change of coat, as deduced from a difference in color, the fact of such a shedding of the fur is demonstrated by the circumstance that in many species, as, for instance, the mountain hare, the individual hairs themselves, as seen under a microscope, differ appreciably in calibre at the two opposite seasons of the year. In that species, for example, the hairs of the winter coat are of a much finer character than are those forming the short dress of summer, which are comparatively coarse and thick.

Moreover, in spite of the natural tendency to believe in blanching on account of the aforesaid abnormal instances of turning white in a single night, there is abundant evidence to show that even in human hair the change from dark to white as age advances is brought about by the replacement of dark hairs by white ones, and not by the bleaching of the former. In this case, however, the change, instead of being seasonal and sudden, is gradual and due to age. If the change was due to blanching, we should, of course, find some hairs which were partially white and partially brown (or black, as the case may be). And here it may be remarked that if such partially blanched hairs were met with, we should naturally expect to find that it would be the basal half which was white, and the terminal half which retained its natural coloring — in other words, precisely the reverse of the condition obtaining in Sir John Richardson's lemming, thereby affording further presumptive evidence as to the abnormal condition of the change in that animal.

As a matter of fact, however, those of us who have reached an age when silver hairs have begun to make their appearance among the brown can easily satisfy themselves that such hairs are white throughout their entire length, and that a hair half white and half brown is quite unknown. From this we infer that the change from brown to white takes place in human beings by the gradual shedding of the dark hairs and their replace-

ment by new ones from which pigment is entirely absent. So that normally there is no such thing as bleaching of individual hairs. The change is, indeed, precisely similar to the one which takes place at the approach of winter in mammals that habitually turn white at that season, with the exception that, as a general rule, it is extremely slow and gradual, instead of being comparatively rapid, and also that the white hairs differ from their dark predecessors solely by the absence of coloring-matter. Unfortunately, there is no subsequent replacement of the white hairs by dark ones!

The fact that the change from brown to white in the mountain hare is really due to a change of coat and not to bleaching was known at a very early period to the English naturalist Pennant; and the existence of this change was likewise recognised by Macgillivray. It was not, however, till Dr. J. A. Allen, in a paper on the color-change in the North American variable hare published in the *Bulletin* of the American Museum of Natural History for 1894, demonstrated by actual experiment the truth of Pennant's statement, that the fact of the complete autumnal change of the coat in animals that turn white in winter was generally recognised by naturalists. So far as the spring change from the white to the brown dress is concerned, his conclusions are fully confirmed by Capt. G. E. H. Barrett-Hamilton, who communicated some interesting notes on the change in the European mountain or variable hare to the *Proceedings* of the Zoological Society of London for 1899. The fact that the vernal color-change is due to the shedding of the coat seems, however, as already mentioned, to have been much more generally admitted than was the case with regard to the autumnal transformation.

Dr. Allen arrives at the conclusion that both the autumn and the spring change take place periodically and quite independently of the will of the animal, and also that they are but little affected by phases of the weather, although they may be somewhat retarded or accelerated by the prevailing atmospheric temperature.

So far as the fact of the seasonal change being normally beyond the control of the animal in which it occurs, Capt. Barrett-Hamilton is in full accord with the American writer; but he goes somewhat further, and believes that it is quite uninfluenced by temperature, or at least by such variations of the same as may be met with in different parts of the area of the British Islands; and, as we all know, these are considerable!

As in the case of many other animals — deer, for instance — the change from the winter to the summer coat takes place very late in the season in the mountain hare in Scotland, specimens undergoing the change being often seen early in May. But the date of the spring change is no earlier in the south of Ireland, where the climate is much milder, although the extent of whiteness assumed in that district is very much less than in the north. This seems to demonstrate the contention that temperature has little or no influence on the change, so far as season is concerned.

That the animal has no control over the change from brown to white in autumn seems to be proved by instances referred to by Capt. Barrett-Hamilton, "in which variable hares transported from Scotland and from Irish mountains to southern and low-lying regions continued for some seasons to appear in the northern garb of snowy whiteness. This persistence of the habit of turning white, even in unsuitable conditions, together with the lateness of the moult, resulted frequently in the curious spectacle of a mountain hare running about in all its conspicuous Arctic livery under the bright rays of an April or May sun. After a few years such imported hares, or more probably their offspring, ceased to turn completely white, and the breed assumed the appearance of the ordinary hares of the southern locality to which they had been transported."

It would, of course, be extremely interesting to ascertain whether such transported individuals ever do give up the practice of turning white in winter, or whether it is only their offspring that do so; but, in any case, it is

clearly demonstrated that the habit is very deep-seated and difficult to overcome.

Very curious is the circumstance that the mode in which the coat is changed in the variable hare at the two seasons of the year differs *in toto* as regards the parts of the animal first affected. On this subject, with one verbal change in the first sentence, I quote from Dr. Allen, who writes as follows:—

"In the fall the change begins with the feet and ears, the sides of the nose and the front of the head, which often become radically changed before the body is much affected; while as regards the body, the change begins first at the base of the tail and extreme posterior part of the back, and at the ventral border of the sides of the body, working thence upward towards the middle line of the back, and from behind anteriorly, the crown of the head and a narrow median line over the shoulders and front part of the back being the parts last changed. In the spring the order of change is exactly the reverse, the moult beginning on the head and along the median line of the anterior half of the dorsal region, extending laterally and gradually to the ventral border of the sides of the body and posteriorly, and then later to the ears and down the limbs to the feet, which are the parts last affected, and which often remain but little changed till the head and body have pretty completely assumed the summer dress."

It is very hard indeed to conjecture any satisfactory reason for this remarkable difference.

The American variable hare ranges, at ordinary levels, about as far south as Massachusetts — that is to say, nearly to the latitude of Madrid, and throughout the whole of this extensive tract it turns white in winter. On the other hand, owing to the much milder climate of Western Europe, no color-change takes place in the mountain hares of Ireland, while it is reported that in those introduced into Ayrshire and the neighboring counties of south-western Scotland the change is much less complete and regular than in those inhabiting the northern parts of the country.

An impression appears to be prevalent that in the more northern portion of their range both the mountain hare and the ermine (or stoat) are white at all seasons, but this does not seem to be authenticated.

Observations are wanting as to whether the changes of coat and color in the mountain hare bear any relation to the appearance and disappearance of snow, or whether they occur regularly at the same season of the year. In the case of the ermine in the Adirondack region of New York, Dr. C. H. Merriam tells us that in this animal the white livery is assumed only after the first fall of snow, while the resumption of the brown coat does not take place till the snow begins to melt. Unfortunately, he says nothing in regard to change of coat. The late Dr. Coues stated, however, that in the case of the ermine the bi-annual change of coat takes place at the same season, but that it depends upon the condition of the temperature at the time whether the new coat differs in color from its predecessor. In other words, the change from brown to white might be due either to shedding the coat or to bleaching of the hair subsequent to such shedding. The case of the mountain hare is, however, strongly suggestive that the color-change is in all instances coincident with the shedding of the coat.

It is, of course, quite evident that the assumption of a white winter livery by mountain hares and ermines living in regions where the snow lies on the ground for a considerable portion of the year is for the purpose of rendering such animals as inconspicuous as possible when in their native haunts. And, so far as we know, such a change is universal among the species named when dwelling in high northern latitudes.

There is, however, another animal inhabiting the North Polar regions of both hemispheres in which the change to a pure white winter dress is limited to certain individuals. The species in question is the Arctic fox, of which the beautiful fur, in both the white and the blue phase, is now much affected by ladies. That both the white and the blue individuals of this species are in the

winter dress will be evident to every one who examines such furs carefully, the length and thickness of the hair being quite decisive on this point.

With the single exception of Iceland, where they are always blue, it appears that the white and the blue phase are met with throughout the habitat of the species.

What makes the matter so puzzling is this: if blue foxes are able to thrive during winter in a snow-clad country, what necessity is there for their fellows — and, indeed, for any species — to turn white at that season of the year?

Important information with regard to the manner in which hair bleaches has been afforded by a communication from Mr. E. Metchnikoff, published in the *Proceedings* of the Royal Society for 1902. It is there stated that the all-devouring cells known as phagocytes are the cause of the mischief. These cells, which frequently have amoeba-like processes, are developed in the central or medullary part of the hair, whence they make their way into the outer or cortical layer, where they absorb, and thus destroy, the pigment-granules. Numbers of these phagocytes may be seen in hair which is commencing to turn white.

"The part played by phagocytes," writes the author, "in the whitening of the hair explains many phenomena observed long ago, but not as yet sufficiently understood." Thus the phenomenon of hair turning white in a single night, or in a few days, may be explained by the increased activity of the phagocytes, which remove the pigment within an abnormally short period.

BIRDS FROM A DOOR-YARD IN NEW ENGLAND.

BY

RALPH HOFFMANN.

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TO be a lover of birds is in itself a recommendation. I shall not hesitate, therefore, to speak freely to the reader of the birds whose acquaintance I have made from my door-yard. I shall introduce him as it were into my household and make him acquainted with many of my most valued friends, some of them my constant neighbors, others regular visitors or passing acquaintances.

Let me first give an idea of the nature of the door-yard which is to be our point of view. It lies almost on the brow of a steep hill, overlooking a broad extent of fields, meadows and marshes, which spread out toward Cambridge. Beyond them rises a series of low hills, covered for the most part with a wilderness of city roofs, but at the left these give way to the more inviting wilderness of oaks in the Middlesex Fells. The sky-line is broken by spires and factory chimneys, by the tall monument on Bunker Hill and the gilt dome of the State House. Above all the varied detail of foreground and background, arches a sky, the extent of which only those who have lived on a hill-top can appreciate. It is like a sky from a vessel's deck, or from a campfire on the plains. In summer the swifts pass back and forth across this expanse of sky; in winter it is rarely broken, save by a straggling line of crows.

Back of the hill is a cedar pasture, where a stranger can lose his way completely, emerging from its recesses to find himself still in plain sight of the State House. The door-yard itself is only half an acre in extent, and is for the most part open; a few trees only are scattered over it. There are no tangles of wild growth; there is

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no stream or pond; in fact, one could conceive of hundreds of small suburban half-acres much better fitted for the resort of birds. It has, however, one great advantage. It lies on the track of the most constant travel from the great southern resorts, where birds spend the winter, to their summer homes; it is on the direct line from Palm Beach to the White Mountains.

In an essay published by Mr. Burroughs in 1868, called "The Invitation," an essay from which as a spring has flowed much of the great stream of bird study of today, occurs the following oft-quoted passage: "It (Bird-study) fits so well with other things, with fishing, with hunting, farming, walking, camping-out, with all that takes one to the fields and woods. One may go a-blackberrying and make some rare discovery; or while driving his cow to pasture, hear some new song, or make a new observation." How the air of the true farming country breathes through these sentences! We, alas, no longer go a-blackberrying, nor drive our cows a-field; but even in our thickly settled suburbs, and during our most prosaic occupation, the birds still offer us their companionship. When I shovel the snow from under the clothes-lines, I can watch the chickadees and downy woodpeckers on the suet overhead; when I am putting creosote on the gipsy-moth eggs, I see golden-crowned kinglets, seeking still smaller eggs, or flying up under the eaves of the barn, in search of hibernating insects. I have had once to change the place where I cut my kindling wood, because a robin chose to build on the window of the woodshed.

Gardening is, however, the suburban bird-lover's best opportunity to discover the birds that are his fellow-residents. How well I recall leaning on my spade early one May, to listen to the first bobolink! He was high above me, flying due north and singing rapturously. From the height at which he flew he could perhaps see the meadows where he had been bred, and I fancied that his song was the greeting of a native returning to his home.

I have often had the fancy that to a lover of birds the country through which he rambles is like a house where dear friends have lived. The trees and bushes where his favorites have nested are repeopled in his imagination by their former tenants, just as the rooms and stairways of the old house recall to our fancy long-vanished forms. When I look out of the window into the dooryard, I am reminded of the indigo bird that sang from the top of my locust tree, of the winter wren that accepted the hospitality of my brush heap, and of the pine grosbeaks that found the frozen apples which I had put out on the veranda.

For several years I kept no visitor's book, but I have been able, by going through my note-books, to recover a fairly full list of the species that I have seen or heard from the yard. By straining a point or two I might have added several species that were just over the line, but I have been very strict, and have included in the list only those that I have observed while my feet were actually on my own land. The list now numbers over ninety. Uhland's traveler, in the poem which Longfellow has translated, paid the boatman thrice his fee for the spirits which crossed with him unseen; perhaps the assessors would increase the valuation of my property, if they knew how often I thought of the light-winged travelers who have made the pilgrimage of the seasons with me.

It has sometimes been only by great urging on my part that some visitor, bound on his own business, has consented to become associated with the history of my yard. One spring, a year or two ago, after I conceived the idea of keeping a visitor's list, I heard an unfamiliar thrush song in a neighbor's yard several rods higher up the hill. It was like a veery's song, but with an upward sliding phrase at the close. I followed the sound with the caution which it is well to employ when dealing with thrushes, and at last found the singer perched on a low limb. He was singing softly, as a migrant hermit thrush sometimes sings, when he is thinking of some dark spruce

covert on the slopes of the New Hampshire hills. The bird was small — unquestionably the small race of the gray-cheeked thrush, a bird I had never before heard sing in Massachusetts. Occasionally the bird hopped to the ground, fed daintily and then hopped back, but showed no disposition to draw nearer to my territory. At last I backed down the steep hill, keeping my glasses focussed on him, made my way over a high wall, and finally stood within my own gate, still keeping the bird in view. He was now one of my guests, though I could hardly say that he had shown any eagerness to accept my hospitality.

One of my neighbors has an arbor-vitæ hedge of extraordinary height and thickness, the dormitory each year of a flock of snowbirds or juncos, that spend the winter on our warm hillside. This flock have been my guests repeatedly, and with every indication of pleasure in their entertainment. I strew hemp seed on a back piazza, almost within reach of my writing desk; the birds soon discovered it, and for two months I enjoyed their comradeship. There were at least seven in the flock, three old males, two females, one young male, and a female with a broken leg. Between six and seven, while it was yet dusk, they left their arbor-vitæ shelter and made a hearty breakfast. They were by no means models of concord in their feeding habits. The biggest male took the centre of the seed covered space, and drove fiercely at any other that came near; the other males took less desirable places, and the females hovered on the outskirts, hurrying off when the males charged down upon them. The poor one-legged female never came with the others, but gleaned after them in a shy, solitary meal. I must admit that I have never seen the snowbirds, when feeding on the open hillside, so rude and greedy; I imagine that if each has plenty of room, he leaves his neighbor in peace.

I learned from these birds the more simple elements of snowbird speech, the smack of alarm when they saw me at the window, the pew-pew-pew, when they chased

each other about, and the crackling twitter when the flock rose and flew. Like many of the other sparrows, they expressed surprise by elevating the feathers of the head to form a small crest.

I put out for the snowbirds both hemp and canary seed. The hemp they found hard to crack; it is large and round, and has to be adjusted in the bill. Occasionally a seed was rejected altogether. When a hemp seed was cracked both husks and kernel were dropped and the kernel then picked up from the ground. But the canary seed was easier to manage; the kernel was held in the bill and the two husks fell out on each side. One morning I timed the one-legged female and found that she disposed of six canary seeds a minute.

After a light snow on the piazza I was interested to discover just what it is that sparrows do when they scratch with both feet at once. I have often seen them jump forward, striking the ground a little distance ahead, and then hop back. I had always imagined that by this backward hop they scratched the surface of the intervening ground. But the tracks on the snow showed that they did not disturb the intervening snow as they jumped back, but laid bare the spot from which they had originally jumped. The distance that one hopped when pursued by another bird was in one case eleven inches; they often hopped a distance of six inches.

One day while the snowbirds were away I had an unusual visitor. I noticed a very pretty pigeon on the piazza, pecking at the crushed hemp seed. A long piece of white string was entangled about its feet. By raising the window and putting seed on the ledge and in the room I induced it to come in. It allowed me to catch it and to cut off the string. I then released it, and after a little time had the satisfaction of seeing it fly off, apparently uninjured.

After a good meal the snowbirds generally returned to the hedge and rested in its recesses, sometimes stopping on the branches of an apple tree to pick up and swallow a little snow. After perhaps an hour they came

again to the piazza for another hearty meal. One morning while I was watching them at rest in the hedge I noticed a much larger bird slipping in and out, apparently in pursuit of them. I finally got a good view of it and saw that it was a shrike, or butcher bird; I did not know before that the shrike still-hunted in such an owl-like fashion.

Shrikes visit me but seldom; the little screech owl, on the other hand, is one of my most constant neighbors. At almost any hour of the night, especially in the fall and winter, the quavering notes of the little mouse hunter come through the open window, sometimes so low and near that I know that the bird is in the trees just outside. One spring, toward the end of March, I saw the little fellow, at about six in the afternoon, in a maple tree in front of the house. It was taking short noiseless flights to the limbs or twigs near by, but instead of alighting it turned on reaching the twig, often at an abrupt angle, and then lit on another limb. It was a warm evening and many canker-worm moths were about. The little owl was evidently varying his diet of mice and had turned entomologist.

The owl was so noisy during the next few weeks that my suspicions were gradually aroused, and when one evening I opened my front door to find an owl sitting on the flagging by the doorstep, I felt sure that there must be some unusual attachment to the locality. I therefore investigated all the holes in the apple trees near by, and was rewarded by finding both parents cosily ensconced in the large cavity, which contained also their two white eggs. Tucked in one corner were the bodies of two English sparrows, perhaps a loving offering from the male to the sitting female. Later the sight of a little owl in broad daylight, mobbed by outraged robins, and his appearance again the next day at an unseemly hour, suggested a calamity of some sort; and, indeed, the hollow proved to be deserted and the two eggs were cold.

The apple tree in which the screech owl's attempt at housekeeping came to such an unfortunate and unex-

plained end was not actually in my yard, though only a few feet away. I cannot, therefore, count the owl as one of my tenants; perhaps guests would be a more accurate term to apply to the birds that have reared their young on my premises, for though they have paid more than ample rent, yet we have never had any strict business relations; they were very welcome to any shelter or food that I could furnish as long as they did me the honor to stay.

Only six native species have actually nested, or laid their eggs, within the limits of my half-acre. A pair of robins rear two broods each year, either on some projection of the eaves or on the branches of one of the apple or spruce trees. One nest was built so low that a child could easily see it, but not see into it. There was a child who longed to see into it, but the attempt to bring the bough within reach by the aid of a rake was not wholly successful, even from the child's point of view, and a dismal disaster for the poor bird. The nest on the barn, which, as I have already said, forced me to move my chopping-block, was in an ideal place to observe the feeding of the young, and this time the children were cautioned against the sin of curiosity. But in a day or two the bird deserted the eggs, and a little cross-questioning elicited the confession that the nest had been examined more than enough times to discourage even the most long-suffering bird. I am afraid that the impatience which impels children to examine peas an hour or two after they have been planted, makes even the best-disposed child a poor neighbor to a nesting bird.

A pair of chipping sparrows are my only other constant fellow-residents. Each year I find the nest, sometimes in the spruces, often in an apple-tree, once in the grapevine. The male has the honor of receiving, in Mr. Brewster's list of Cambridge birds, highest honors for punctuality; in 1903 he appeared on March 26, breaking all previous records by four or five days.

Yellow warblers and least flycatchers have also nested in the apple trees. A song-sparrow nests either on the

place or very near it, but here, with two very important exceptions, the list of my tenants must end.

The story of the yellow-throated vireo which became almost an inmate of my household, fed from my fingers, and drank from a silver spoon has been told elsewhere. Three times the vireos have nested on various of my apple trees, but perhaps they felt at last that my attentions were as burdensome as the curiosity of the children. At any rate for the last two years they have deserted me for neighboring dooryards. The female did come last May to my grapevine for nesting material, but I did not even discover where she carried it.

One year a female cowbird slunk into the yard and dropped an egg into the vireo's nest. I removed it promptly; and I do not believe that while I have lived on the place any of this parasitic tribe has been reared there. Not that I have any special dislike to the cowbird, but I feel that I must protect my tenants.

I wish I could present an equally clean bill of health in the matter of English sparrows. Alas, I must even plead guilty to having provided these wretches with shelter, a home, food — I was going to add raiment — but all, I hasten to explain, involuntarily. It is a sad story, and really begins with the purple martins. One June I was awakened several mornings in succession by dreaming of purple martins — that is to say, I woke with the feeling that I had been hearing the loud rich notes of the martin, — and, inasmuch as the nearest martin box that I knew of was in Lexington, four or five miles away, I assumed that it was of course a dream. A morning or two later, as I was waiting for my train, I was startled by again hearing from the sky overhead the note of a martin, and looking up I saw the broad wings of this noble swallow in the air above me. Here was a mystery, indeed! It was June, the season when the birds were surely nesting. Where was their box? A day or two later I discovered it by accident.

I was walking through a street at the foot of the hill on which my house stands, when I heard the rich twitter-

ing of martins and looking about me, saw a bird-box in the small yard behind a laborer's house, and the martin perched on the edge. On inquiry I learned that the people were Germans, who had lately come over to this country, and having been used in the Fatherland to welcome the society of singing birds, they had built this box after settling here, and lo! their faith had been rewarded. The only pair of purple martins for miles around had taken up their residence in their back-yard.

I was fired with enthusiasm and at once ordered a bird-house. I made it larger and taller than that of the German laborer. If he had reproached me with intending to lure away his one ewe-lamb, I should probably have answered that such was not my intention, that all I hoped was that the progeny of his martins, the surplus population of his colony, would in later years emigrate to my box on the hill. But if his martins had, the next year, preferred my more pretentious abode, I am not prepared to say that I should have felt it my duty to return them to him. During the winter the box was naturally occupied by English sparrows, but when spring drew near, I felt obliged to take measures to drive them out. I secured a gun and started on a war of extermination. But Sunday was the only day that I was much at home, and the gun made a much louder noise than I had expected, a really shocking noise, coming on the quiet of the Sabbath morn. I felt that there was something a little indecent in the situation, a director of the Audubon Society destroying small birds, even though they were English sparrows, and causing such an uproar in the peaceful little town. And often after I had broken the stillness by the discharge of my gun, the sparrow instead of dropping dead, flew off uninjured. Very soon, too, the sparrows flew when they saw me coming, but returned to the box as soon as I went away. The first spring therefore found the sparrows in full possession of the box and no purple martins in sight.

Now a neighbor had put up about this time a small butter-tub, not nearly so attractive as my bird-house,

which had been at once appropriated by a pair of tree swallows. When the next April came, these returned and with them appeared another pair, twittering and circling out into the expanse of warm sky, or lighting here and there to flutter their steel-blue wings or preen their snowy breasts. Imagine our excitement when they began to play about our bird-box and finally perched on the roof. The sparrows had by no means filled all the compartments; the female peered into one of the empty ones, and at last she vanished inside. In a moment her blue head appeared again at the opening. By this time, however, the sparrows had discovered the strangers, and in a moment there was a confusion of brown, white and blue, and a vast deal of noise. For three or four days the swallows kept up their interest in the box, but apparently there was to be no peace or quiet, and they finally ceased to come. If I want to see one, I must go over into my neighbor's yard, and there on a telephone wire or circling overhead, is this miracle of grace. I must do my neighbor the credit to admit that he appreciates his blessings, but that does not prevent me from coveting them.

The history of my bluebirds is still more distressing, for a pair actually began a nest in my box. I saw the female fly to the street and return with a straw which she carried into one of the rooms, while the male warbled and fluttered his wing-tips in ecstacy. I almost held my breath when I thought of actually having bluebirds, where the sparrows had so long held sway, of having color and music instead of dinginess and noise. But after a day or two the bluebirds, too, gave up the struggle. So now I patiently rear from ten to fifteen English sparrows each season. Friends coming to the house always notice the box and humiliate me by asking cheerfully what I have in it. I suppose I ought to take it down and acknowledge my defeat.

I am glad that my neighbor has had better luck. If he had not succeeded in attracting the tree-swallows, I might never have heard the curious early morning flight-

song which this swallow utters during the breeding season. One May morning I happened to wake a little after three; it was still quite dark, but as I listened, there came in through the window a constant succession of notes, evidently from a bird flying well up in the air. It sounded first near, then far. No other birds were singing. The old moon was shining faintly, and soon the robins began to wake in the dark masses of the trees. Then a summer yellow-bird began to sing. But all the time, out of the darkness overhead, came the mysterious song, tik, tik-eé, tik, tik, tik-eé. I went out and waited for the first faint light to make sure of the singer, though by this time I suspected the tree-swallow. At first I could only make out the dim form of some bird, now close to the ground, now among the trees, but generally about one hundred feet up and always singing, as if the whole performance were an expression of his exuberant vitality. Even after four o'clock, after the redstarts and chipping sparrows had begun to sing, the swallow was still flying and still singing.

The list of songs that have come in through my open window in the morning would be too long to give here. In May and June, all the birds characteristic of a village street join in the chorus — that early morning chorus, so hopelessly confusing to the beginner, so full of suggestion to the practised ear. As a musician analyzes the combined sounds of an orchestra, and recognizes the part played by each separate instrument, so the bird-lover hears in the morning chorus the songs and calls of many species, the slender trill of the chipping sparrow, the languid drawl of the wood pewee, the high sharp notes of the warblers — one is tempted to go on with the list and let the imagination, at the mere mention of the singers names, conjure up the succession of delightful sounds.

In three instances even my ear, partial as it is to bird voices, has been irritated and offended by the songs of certain of my neighbors. One year a flicker, who for some unknown reason was not content with the time generally allowed by his fellows for vociferating, kept up a

constant shouting all day and every day, throughout the spring. I could only suppose that he had not succeeded in finding a mate and was vigorously advertising his loneliness. First from one side of the house, then from the other, in the early morning, at noon, and at evening came the repetition of his high-pitched emphatic challenge. The second offender was an oriole whose song had a peculiarly irritating ending, suggesting but never actually giving the key-note. The third was a rose-breasted grosbeak. The song of this last performer was at first a surprise and a delight, for he not only had the rapid rich warble of his kind, but when in an unusual ecstacy he followed it by a sound that suggested a long intake of breath and then a little downward run. But this coda came only every third or fourth time, and when one lay awake early in the morning, it was impossible not to listen for it, and to wonder at each delivery of his song which form it would be. To those of my readers who are so fortunate as to know nothing of sleeplessness, I must explain that sounds that succeed each other at irregular intervals are not conducive to slumber. No lullabies have been written, as far as I know, in ragtime.

I have already spoken of the flight-song of the tree swallow, heard in the dark sky before dawn. Two other neighbors of mine have flight-songs, of which they are rather more chary than the swallow. The performance, however, is set for a time when I am more likely to be awake. The phœbe, though formerly not uncommon in the neighborhood, is gradually withdrawing, as the strictly farming country changes to suburban settlements. Occasionally one still nests near enough for me to hear his flight-song, a curious succession of notes,—whit, whit, whit, phœbe, phœbe, phœbe, which the bird utters as he flies up some distance into the air and during his quick descent. His smaller relative, the least flycatcher, or chebec, has a similar performance, which I hear so often at about the same time in the evening that I have had the curiosity several times to note the exact minute. I find in my notebook the following entries:

Chebec's flight-song, May 21, 7.25; May 25, 7.25; June 5, 7.25. I think that the little fellow hardly keeps such exact watch of the time as these records would indicate; I fancy that the gathering darkness having reached about the same intensity, warns him to indulge in his vespers before settling for the night in some leafy shade.

In June I often sit on my veranda waiting like the chebec for the darkness to gather. I look over my neighbors' houses lower on the hillside, and often as I look, a pair of chimney swifts, sharply outlined against the sky, fly up over the opening of the chimney, and with wings held poised above their backs, drop down and vanish for the night. I have noted the time for their disappearance and find that at about the end of May it is close to seven o'clock. I have often wondered if other swifts use my chimneys for their bedroom. If they do, they are unusually quiet neighbors, for we have never been disturbed by their noise.

Birds, like the Esquimos, adapt their sleeping hours to the seasons. In winter their day is very much shorter and their night proportionately longer. One winter a chickadee used a hole in one of my apple trees for his night's lodgings. When I first saw him, on March 15, at half past five in the afternoon, he was hopping about near a hole in the apple tree and scolding so incessantly that I thought at first that he had found an owl in the hole. Then with one dive he disappeared into the hole, and though I watched for the next ten minutes, I saw nothing more of him. One November, as early as half-past four, I saw a downy woodpecker fly into his quarters for the night,—bed suggests a little more luxury than the downy is used to; the chances are that he stayed till at least six the next morning — thirteen and a half hours' sleep! In summer, on the other hand, those birds that sing till nearly eight and again a little after three get only seven hours' sleep. Our ancestors, of course, once followed similar practices and only modified their habits when artificial light was discovered. As far as I have observed, however, the sparrows that nest over the arc lights have not yet been seduced into keeping late hours.

I have already spoken of the birds that have found lodging on my premises, either shelter for the night, or permanent quarters in which they have reared their young. It seems fitting therefore to make mention of my boarders, for whom I have spread a table where they have enjoyed more or less regular meals. I have already described the snowbirds which came each day for their rations of hemp or canary seed; my other regular guests were members of the little winter company which now visit many houses where bones or suet are hung up.

The chickadee is without doubt the most attractive of these visitors; the other two, the downy and the nuthatch, go to work with business-like determination, rarely changing their position till the meal is over. The chickadees, however, make such restless play with their wings, one succeeds the other in such quick succession, that there is a continuous flutter and excitement, and a constant succession of pleasant sounds. The cheerfulness so characteristic of the chickadee, a trait which has won him a fame as enduring as Emerson's, was well illustrated by one of my guests, who sang his phee-bee notes, not only in a downpour of winter rain, but even when the mercury stood at only fourteen above zero.

In cold weather, especially in a snow storm, the little band are almost continually at work. After a fall of snow in the night, almost the first duty of a householder should be to brush the snow off the suet, so that the birds can reach it. The birds remember the spot where it is nailed to the limb and themselves try to dig their way into it, when it is hidden by snow. I am convinced, moreover, that they remember it from year to year, for one morning in the autumn just after I had put up the first piece of suet, and while I was still in the tree, a nuthatch appeared, flew directly to it and fell to feeding. On another occasion I noticed, in May, a downy woodpecker in some locust trees fully twenty yards from the apple tree where the suet had been nailed through the winter. The suet had become so black during the warm weather that I could not distinguish it from the bark on which it lay,

though I stood only a few feet from it. I had seen no birds at the suet for nearly two months, but to my surprise the woodpecker flew from the locust directly to the suet and began to hammer out a meal. Memory, such as is shown in these instances, is after all not surprising, when we recollect the long journeys which migrants take to and from their summer homes, or the amazing ability of some of the sea-birds to recognize their own eggs among thousands of others all alike and in similar situations.

Once in a great while I see a brown creeper steal along the limb and peck at the suet, and snowbirds occasionally stop as they fly by and pull off a loose shred. Kinglets are often in the tree, but I have never seen them at the suet. When the red-bellied nuthatches are here, they are constant visitors and are as active and amusing as ever. They fly off with little pieces of fat and hammer them into the crevices of the bark, and then hurry back for more with undignified short-tailed flight. I have never seen either the hairy woodpecker or the blue jay at the suet, though both have come into the yard. The birds never stay at the suet for any considerable length of time, except in very cold weather, but vary their diet by gleaning from the twigs and branches.

Many pictures have been shown in the last few years of chickadees and nuthatches feeding from someone's fingers or even from the lips. It is easy to train them to this pitch of confidence by holding out seeds in the gloved hand where they have been in the habit of finding a supply, at first perhaps pulling down the window-shade. The curious thrill felt when the little claws grasp one's fingers is an experience which I recommend as a full reward for whatever time and patience are needed.

THE BOBOLINK.

BY

WASHINGTON IRVING.

THE happiest bird of our spring, and one that rivals the European lark, in my estimation, is the bobolincon, or bobolink, as he is commonly called. He arrives at that choice period of the year, which, in this latitude, answers to the description of the month of May so often given by the poets. With us it begins about the middle of May and lasts until nearly the middle of June. Earlier than this winter is apt to return on its traces, and to blight the opening beauties of the year; and later than this begin the parching and panting, and dissolving heats of summer. But in this congenial interval, nature is in all her freshness and fragrance; "the rain is over and gone; the flowers appear on the earth; the time of the singing of birds is come, and the voice of the turtle is heard in our land." The trees are now in their fullest foliage and brightest verdure; the woods are gay with the clustered flowers of the laurel; the air is perfumed by the sweetbrier and the wild rose; the meadows are enamelled with clover blossoms; while the young apple, the peach, and the plum, begin to swell, and the cherry to glow, among the green leaves.

This is the chosen season of revelry of the bobolink. He comes amidst the pomp and fragrance of the season; his life seems all sensibility and enjoyment, all song and sunshine. He is to be found in the soft bosoms of the freshest and sweetest meadows, and is most in song when the clover is in blossom. He perches on the topmost twig of a tree, or on some long, flaunting weed, and, as he rises and sinks with the breeze, pours forth a succession of rich tinkling notes,— crowding one upon another, like the outpouring melody of the skylark, and possessing the same rapturous character. Sometimes he pitches from

From "Wolfert's Roost."

the summit of a tree, begins his song as soon as he gets upon the wing, and flutters tremulously down to the earth, as if overcome with ecstasy at his own music. Sometimes he is in pursuit of his paramour; always in full song, as if he would win her by his melody; and always with the same appearance of intoxication and delight.

Of all the birds of our groves and meadows, the bobolink was the envy of my boyhood. He crossed my path in the sweetest weather, and the sweetest season of the year, when all nature called to the fields, and the rural feeling throbbed in every bosom; but when I, luckless urchin! was doomed to be mewed up, during the livelong day, in that purgatory of boyhood, a school-room. It seemed as if the little varlet mocked me as he flew by in full song, and sought to taunt me with his happier lot. Oh, how I envied him! No lessons, no task, no hateful school; nothing but holiday frolic, green fields, and fine weather. Had I been then more versed in poetry I might have addressed him in the words of Logan to the cuckoo:—

> Sweet bird! thy bower is ever green,
> Thy sky is ever clear;
> Thou hast no sorrow in thy note,
> No winter in thy year.
>
> Oh! could I fly, I'd fly with thee;
> We'd make, on joyful wing,
> Our annual visit round the globe,
> Companions of the spring!

Further observation and experience have given me a different idea of this little feathered voluptuary, which I will venture to impart, for the benefit of my schoolboy readers, who may regard him with the same unqualified envy and admiration which I once indulged. I have shown him, only as I saw him at first, in what I may call the poetical part of his career, when he in a manner devoted himself to elegant pursuits and enjoyments, and was a bird of music, and song, and taste, and sensibility,

and refinement. While this lasted he was sacred from injury; the very schoolboy would not fling a stone at him, and the merest rustic would pause to listen to his strain. But mark the difference. As the year advances, as the clover blossoms disappear, and the spring fades into summer, he gradually gives up his elegant tastes and habits, doffs his poetical suit of black, assumes a russet dusty garb, and sinks to the gross enjoyments of common vulgar birds. His notes no longer vibrate on the ear; he is stuffing himself with the seeds of the tall weeds on which he lately swung and chanted so melodiously. He has become a "bon vivant," a "gourmand;" with him now there is nothing like the "joys of the table." In a little while he grows tired of plain, homely fare, and is off on a gastronomical tour in the quest of foreign luxuries. We next hear of him with myriads of his kind, banqueting among the reeds of the Delaware; and grown corpulent with good feeding. He has changed his name in traveling. Bobolincon no more,—he is the *reed-bird* now, the much-sought-for tidbit of Pennsylvania epicures; the rival in unlucky fame of the ortolan! Whereever he goes, pop! pop! pop! every rusty firelock in the country is blazing away. He sees his companions falling by thousands around him.

Does he take warning and reform? Alas, not he! Incorrigible epicure! Again he wings his flight. The rice swamps of the South invite him. He gorges himself among them almost to bursting; he can scarcely fly for corpulency. He has once more changed his name, and is now the famous *rice-bird* of the Carolinas.

Last stage of his career; behold him spitted, with dozens of his corpulent companions, and served up, a vaunted dish, on the table of some Southern gastronome.

Such is the story of the bobolink; once spiritual, musical, admired; the joy of the meadows, and the favorite bird of spring; finally, a gross little sensualist, who expiates his sensuality in the larder. His story contains a moral worthy of the attention of all little birds and little boys; warning them to keep to those refined and

intellectual pursuits which raised him to so high a pitch of popularity during the early part of his career; but to eschew all tendency to that gross and dissipated indulgence which brought this mistaken little bird to an untimely end.

Which is all, at present, from the well-wisher of little boys and little birds.

THE ARREDONDO SPARROW HAWK.

BY

T. GILBERT PEARSON.

"ARREDONDO GRANT" is the name of a tract of country of perhaps forty thousand acres, lying in central Florida. It is a region of low, rolling sand hills, dotted with numerous shallow ponds and thinly clad in forests of yellow pine. Many small farms and orange groves add variety to the landscape. The origin of the name dates back to the time the Spaniards ruled the country and General Arredondo received the territory for services to the Spanish government.

The variety of bird life here is not great, but the species which occur are generally represented by many individuals. One of the most common is the little American sparrow hawk, which remains throughout the seasons. It is the smallest of the falcons. Seldom have I seen a bird which aroused in me a keener interest or deeper sympathy than did one of these sparrow hawks, whose path of life for some years ran parallel with my own.

To distinguish him from another hawk which lived to the westward outside of the Grant, I called our hero the Arredondo sparrow hawk. Later, when I learned to know him well, I named him Dick.

From "Stories of Bird Life." By T. Gilbert Pearson. Copyright, 1901. B. F. Johnson Company, Richmond, Va. By permission.

The first time I remember to have seen Dick was on a clear balmy morning in middle January while the last of the orange pickers were going about their work. He came out of the woods flying high and going as though an eagle were after him. Over the orange grove he swiftly passed and turning slightly to the left flew toward a tall lightning-stricken pine standing at the edge of the rice field. "*Tilly-tilly-tilly-tilly!*" he cried as he swept along. Over and over he repeated his call, until, slacking his speed with quivering wings, he settled on the lifeless pine.

Not all birds have mates. There are many single females and many wifeless males. There are widows and widowers, and often many little orphans are left in the world. But old Dick was none of these, for down in the pines was the prettiest, dearest little sweetheart for which a sparrow hawk ever sighed. True, she was slightly heavier than he, and her wings were broader and her waist was fully as large, but these things only added to her attractiveness, and besides, she was his mate, and he loved her as only a blue-winged, striped-cheeked sparrow hawk can love.

A bird has three main purposes in life. First, to secure food for its existence; second, to avoid its enemies; and third, to rear its offspring. In studying the history of any bird one learns the details of these three phases of its life. With many birds this is difficult to do. Some are very timid, and conceal themselves in the grass and shrubbery. The homes of a few are in almost inaccessible swamps. Still others live far away on the rolling ocean, and are seen only by mariners and travelers.

Not so with the sparrow hawks. In almost any locality in the United States they may be found, although their numbers are greater as one travels southward. Nor do they hide from sight. Their perch is usually some tall stake or tree; their food is caught in the open; their pathways of travel are in full view through the boundless sky.

Scarcely a day passed that I did not see Dick. He came repeatedly to his perch on the dead pine and called, until one day his mate joined him. At once he launched into the air, and for her pleasure began a series of elaborate circles and evolutions. The open space of the field was his parade ground, the top of the blasted pine was her grand stand.

At times he flew slowly, and again with high speed, now skimming low, now soaring high above the earth. Far out over the rice field and grove he went, then turning, came hurrying back through the air, flying to his mate, calling to the love of his youth, his blood leaping high with the ecstacy of spring time. How he strove to please her by flashing his pretty feathers in the sunlight! How delighted he was if she deigned to accept any article of food which he had to offer!

Two hundred yards in the woods stood an old blackened and broken pine with its head reaching forty feet from the ground. At some distant date, now far out of mind, a flicker had chiseled a hole near its top for her nest. The owner used it probably only for a single year. Since then it had become the habitation of the Arredondo sparrow hawk and his mate.

One day I saw Dick fly up to the nest with a lizard in his mouth. He entered, and from its dimly lighted depths issued a strange, low sound,— at that time a new call to me, and one which I have seldom heard since, save in the neighborhood of the nest. A moment later his head appeared at the opening, and the strange love call was repeated. Evidently it was an invitation for her to come and see what a nice home was that hollow in the tree, and incidentally, to have something good to eat.

On the tenth of April the nest held four beautiful eggs, blotched and spotted with varying shades of brown and chocolate. A boy promptly climbed the pine and took the eggs. On the twenty-ninth of April five more were added to the boys collection. Undismayed the parents still clung to their old home and nineteen days later there was still another set of four eggs in the nest. But the

Arredondo sparrow hawk was destined to rear no young that year, for the third time the tree was climbed and the nest rifled. After this the birds gave up the attempt and no more eggs were laid that spring.

The next year they were more fortunate. The boy who had had a mania for robbing nests had learned better. Four young sparrow hawks were reared with much care and great labor. In the autumn the young males went through the maneuvers of love making. They circled about the sky, clamoring in a noisy manner; one of them even went so far as to cling to the side of a tree and look into an old woodpecker's nest and try his voice on the low love call. This was just playing at love making, however — a harmless sort of flirtation before the summer season was quite gone. Swallows and others have been seen to engage in similar diversions.

It some times occurred that a large hawk would come to the farm near by and take a chicken. As a preventive against such raids the farmer planted near his chicken yard some tall poles. On cross pieces near the top of these he tied a number of gourds, in each of which a round entrance hole had been cut. This was a standing invitation to purple martins, who read by the sign that here were rooms to let. So it happened that each season several pairs made these gourds their homes.

Martins keep a sharp outlook for hawks. I often noticed, however, that the sparrow hawk or his mate discovered the presence of the chicken killer before the martins, and by their loud cries and bold attacks quickly drove it from the neighborhood.

One cloudy summer afternoon a great horned owl came out of the big woods and alighted on a pine near the farm. Now, most birds dislike the larger hawks because they sometimes catch small birds; they have little relish for the crow, for he has been known to steal eggs; but they hate, literally *hate* and dread an owl. His dark deeds are done under cover of the midnight shadows when all are asleep. Like a thief in the night, he descends upon the unconscious victim. Where is the feathered creature that loves an owl?

A red-headed woodpecker was the first to discover this big horned fellow, and his wrathful notes told at once of danger. Other birds were attracted by the noise, and came quickly to join their voices in a chorus of protests. Such a bedlam of sounds they made, as flying about the tree or hopping among the branches they heaped upon the unfortunate owl all the vile epithets they could command! There were a pair of mocking birds, a shrike and several blue jays; and a dozen martins added their cackling notes to the uproar.

High above all flew the Arredondo sparrow hawk. Suddenly he descended straight as an arrow at the head of the hated owl. The old rogue dodged the blow and soon turned his wing-beats toward the depths of the forest. Above him in the air hung the pair of sparrow hawks, who continued their pursuit, taking turns at striking down at him, for fully half a mile of his flight.

The food of the sparrow hawks consisted largely of grasshoppers, together with a sprinkling of beetles and crickets. I have seen them capture the little striped lizards common along the paths and highways of Florida. But first and last their fare is grasshoppers. Where they find them when cold weather comes would be hard to tell, but find them they do, and in great numbers as well. Woe to the luckless grasshopper that lives in a field over which a sparrow hawk keeps watch!

The hard indigestible parts of the insects are disgorged in balls the size of small marbles, and may be found about their roosting places. Like an owl, the sparrow hawk eats its prey, and afterward at leisure picks out and discards the objectionable parts.

Unlike many others birds Dick and his mate associated together throughout the year. They roosted under the eaves of a public school building standing within the border of their domain. The male was ever distrustful of a man and knew to a nicety the range of a gun, for he always left his perch before an effective shooting distance was reached.

The female was very trustful. Would that she had

known better the heart of man! One day a boy stealthily approached to within a few yards of where she sat and suddenly throwing a heavy stick, struck her to the ground. He quickly beat her into unconsciousness and after a look at her feathers threw her body down beside the path. And there old Dick's mate lay in the sunshine until the ants, which soon swarmed over her, had consumed her flesh, and the feathers went dancing before the wind across the stubble of the rice field.

It has sometimes been claimed that eagles mate for life, and that if one of a pair is killed the surviving member will never mate again. The same has been said of swans and some other birds. I do not know if these things be true, but I do know that the Arredondo sparrow hawk, bereft of his companion, did not mate again during the three subsequent years in which I knew him.

He did not appear to miss his mate until the warm days of January came. Then the swelling buds and the soft winds from the Gulf began to sing weird, sweet strains in his ears. Out of the woods he came bounding one bright morning, and circled on strong wings about the orange grove. He called and signaled as he cleaved the air above the rice field in his graceful flight. But there was none to answer him, no bright eye to follow his movements on his aerial parade ground, for no fond spectator sat on the top of the dead pine tree.

Day after day he came in vain to their trysting place. Day after day his yearning heart was unstilled, and his eager eyes sought through sky and field and forest his lost companion. One day with food in his beak he flew up to the old nesting place, and in deep quiet tones gave the low love call so dear to his mate in other days.

For more than a fortnight the faithful bird sought his own, and then, yielding to despair, ceased to call, and the long, cheerless silence of a mateless life closed in upon him.

MARSH CRADLES.

BY

IRENE GROSVENOR WHEELOCK.

Author of "Birds of California," etc.

Dear marshes! Vain to him the gift of sight
Who cannot in their various incomes shares,
From every season drawn, of shade and light,
Who sees in them but levels brown and bare.
Each change of storm or sunshine scatters free
On them its largess of variety,
For Nature with cheap means still works her wonders rare.

LOWELL.

A TRAMP through the marshes at four A. M., waist-deep in the lush wild grass, the mists veiling the wonderful unseen beyond, and, in the near distance, the pink of the mallows, the purple of the iris, and the yellow of the marigold still heavy with the dew, reflecting the glories of the sunrise sky; to hear the bird chorus as you never hear it at any other hour of the day; to see the birds waken, stretch their little wings, and enjoy a morning bath, splashing and dashing as if they could never have enough of the cool fresh water; to watch them shake and preen their little wet feathers as they sit swinging on the cat-tails; to follow their flight over the listening green, dipping, rising, circling in matchless curves,— is not all this well worth the sacrifice of a morning nap?

But the marsh is a faithful keeper and guards its secrets well. Much hard work, many discomforts, some danger, and small success will often be the sum total of a day spent there. The little marsh people are shy and very, very wily. Of twenty-nine marsh wren's nests

From "Nestlings of Forest and Marsh." By Irene Grosvenor Wheelock. Copyright, 1902. By A. C. McCling & Co., Chicago. By permission.

examined in one day only one had eggs in it, the rest being either dummy or last year's nests. Afterwards the same proportion was encountered in another marsh.

The nest we had chosen to watch was in the centre of a little island of rushes separated from the main marsh by a passage just wide enough to punt a duckboat through. Here we lay, partly concealed, while the anxious little father scolded and sang by turns, and then with deliberate intention to deceive, commenced to build a dummy nest in full view of us. Evidently his heart was not in his work, or our presence made him nervous, for it was not well done and he left it one-third completed to commence another a few feet farther away. This was repeated day after day, until four had been started and two finished in a radius of ten feet by the same industrious builder. All the material brought was wet, having just been picked from the water.

He was a handsome happy little chap, in a coat of brightest brown and cream buff, much more attractive than his relative, the short-billed marsh wren, and more musical. The song of the short-billed is like a shrill childish chatter, only ceasing from lack of breath, while the long-billed is a clear, silvery tinkle like a chime of silver bells. The nests can scarcely be distinguished, but I think those of the long-billed are more carefully concealed and less likely to be "dummy."

Not once did he go near his real treasure. The four beautiful tiny brown eggs were housed in the oldest, most tumble-down house of them all. One would never suspect it of being selected for a home among so many fresh green new ones. The doorway also was on the inland side, so that it looked to be only a ball of dried water-grass among the rushes. The doors of the dummy nests, on the contrary, were usually in plain view from the lake and invited inspection. The exposed position allowed the fierce sun to beat upon the little dwelling in full force, and I wondered whether the thick walls and roof were for the purpose of shelter from the heat or to protect from chill. They are so damp one would suppose the

eggs might all be addled, but I have never found this to be the case. Marsh hawks and musk-rats cannot reach the eggs through the tiny doorway, so the enemies most to be feared are the numerous varieties of water-snakes. These twist around the reeds which support the nest, and by their weight break it from its fastenings, and overturn it after they have gorged themselves upon its contents. The brave wrens have a serious time guarding their homes from these marauders, and a dread seized us each morning lest the treasure in this one be gone. But so well surrounded and concealed was it that the brood was reared without mishaps, and five little marsh wrens were safely launched into a world of waving green.

It took fifteen days for the eggs to hatch, and afterwards such a long, long time before the first downy head peeped through the doorway. The mother was not a close sitter, whether because of our presence or because she knew the warm sun would help in her task. It was certainly steaming inside that round ball, and the tiny eggs felt like hot pebbles to my prying fingers. She left for two hours at a time, and this, with an open nest in a tree, would certainly prove fatal to the eggs after incubation has begun. Often and often I feared that she had deserted it entirely, and began to reproach myself as being the cause, but always, just as my conscience became seriously alarmed, she slipped back, noiselessly as a wee brown mouse. I never saw the father bring her food or notice her at all, yet no move of hers escaped his watchful eyes.

On the morning the first egg hatched there was a change in the vicinity of that small homestead. The father, no longer at his post scolding, was either silently flitting to the nest with small bugs in his beak or singing his merriest several feet farther away than usual, trying by every art to attract attention to himself. But we cautiously pushed up to the doorway, and on finding there were young, cut a slit in the top of the nest to look at them. Four naked pinky nestlings, with wee heads, mere nobs for eyes, and buds for wings, lay cuddled down

within. After satisfying our curiosity we tied the slit up with rushes and left them. Before we could push the boat away the little mother had entered the nest not two feet away from us.

Four days later we went again. Their eyes had begun to open, and a light brown down covered their bodies. The funny holes for ears, so apparent in all naked young birds, were even more conspicuous in them, and the little slits between the eyelids, only half open, gave them a very sleepy look. Bill and legs were a soft, burnt-orange color, shading to light. Fearing to disturb them too much by photographing them in their immature state, we gently replaced them in the nest and left them for another week.

Six days later we visited the nest again, and found them so far grown that one was being crowded through the doorway tail first. Again we untied the slit and took them out one by one. They were beautiful babies! Exactly like their handsome little father. Cream-buff downy feathers covered the breast and sides, merging into pure white on the belly. The head, wings, and tiny stub of a tail were cinnamon-brown. Bills and legs were still verging on the burnt-orange color, but shading to darker rather than light.

I said "tails," but really they had only "promises" or none at all, and the rump was alarmingly bald through the thin down. The little oil sack could plainly be seen, and was much more conspicuous than in the case of birds who nest away from the water. Yet I have never known the marsh wrens to bathe with unusual frequency, or to like the water any better than their land cousins.

As in the case of most young birds, we had to teach them to perch; and a comical task it was. The tiny claws had never learned to clasp, and yet by instinct they fastened to the rushes, and the little ball of down tried to balance itself on its uncertain little legs. I stood always with a hand ready to catch one in case of an unlucky tumble. They liked to cuddle down on our fingers or hop up my arm to the shoulder, and took especial de-

light in hiding inside my shirtwaist sleeve, entering at the wrist, which the heat had compelled me to unfasten.

They were certainly the very prettiest of all our bird babies, unless we except the young chickadee, — when the question becomes a choice between soft grays or browns and white. Being so much more helpless than the chickadees, they appealed to my heart as no other feathered babies ever have done.

As soon as we had placed them nicely within focus of the camera on the rushes, one would decide to snuggle up a bit closer to his neighbor, and the next moment the four would perform feats of tumbling not seen in any vaudeville. Some of the feathers were not entirely out, and this seemed to bother them, for their little heads were constantly turning back in frantic efforts to preen their funny apologies for wings, thereby upsetting themselves a dozen times.

After photographing we followed our usual rule and returned them to the nest. Immediately a little head popped out of the doorway, followed by a ball of fluffy brown and white, which scrambled at once up onto the roof of the little house and sat there. It was followed by another, who did exactly the same thing, except that he tumbled and caught hold of one of the bulrushes, and after some struggling regained his balance and reached a place beside his brother.

This was their first taste of freedom, and how they revelled in it! Looking about over the wide stretch of waving green marsh-grass, they chirped a startling imitation of their father's tinkling song and quivered with delight. Not once had one of the four opened his mouth as if hungry, even when left alone. After a reasonable length of time we tucked them back in the nest again and, tired out, they were glad to stay there.

During the hour or two we were playing with the babies the father and mother remained within a few feet, calling somewhat anxiously but not greatly alarmed. I held a little one out on my hand and went almost up to the mother before she took wing. Had not the great heat

(106 degrees) driven us out of the marsh, I am sure more patience in waiting would have conquered her fear of me, and she would have fed him on my hand. Before we were four feet away, she had returned to them with a fat June bug in her beak, and all was serene again in the little home.

To see the first flight of those babies required no small effort, but we felt well repaid. Just as the sun came out from behind the hills and peeped into the small round doorway, a tiny brown head appeared, then out came the wee bird, evidently assisted from behind by a too eager brother or sister. He made his way on to a rush and clung there until out came a second, and aiming for the same perch, sent him tumbling to another; a third flew from the door to a cat-tail without mishap.

The father came near with food, and called; with confidence of ignorance the first baby let go his hold, and managed, half fluttering, half scrambling over the marsh-grass, to reach the proffered breakfast. The second and third were not long in following suit, and both received well-earned reward. Then, with appetites surfeited, they blinked sleepily and dozed, while the parents, distracted between guarding them and watching me, were busy and unhappy. But where were the others? No more heads appeared in the doorway. A gentle shaking failed to start any. A finger put cautiously in found it empty. The other two had either been stolen or had flown the day before and were hidden in the grass. We searched as best we might and could find no trace of them, nor did we see them with the old birds afterwards, although we kept watch for days. Then we remembered having passed a large water-snake coiled up on the bank not far from the nest with a half-swallowed bird sticking out of his mouth. So disgusting was the sight that I had hurried by without investigating, never dreaming it might be one of my baby wrens.

To be lost in the maze of a wild-rice marsh, although an unpleasant experience, is not without its compensation. Usually the latter is more apparent afterward

than during the anxiety of the moment, but this was not the case on the day I heard and saw my first sora rail. It was a warm day in early June when, punting our boat through a narrow channel, we made a wrong turn and immediately lost our bearings. In and out among the rushes we pushed our way only to become more and more bewildered. Not one familiar spot could we see; not a single bulrush that we had ever passed before. Tired out at length, we concluded to lie still and, Micawber-like, wait for something to turn up. A hush was over everything, the yellow-headed blackbird had long forgotten to sing, when suddenly from the water under our boat or from the rushes on this side and on that came weird cries, not of earth and certainly not of heaven. The Man with the Camera looked at me and raised a warning finger for silence. Breathlessly I waited, expecting to see nothing less than old god Pan emerge from the rushes. Nothing like this had I ever heard before, and the possibilities were almost overpowering.

After a long time, during which the strange noises continued, we caught sight of something skulking through the reeds at the edge of the open water. Our eyes interrogatively telegraphed the one word "Rail?" and then we watched more breathlessly than before. The little creature stood motionless for several minutes, its dull plumage rendering it safely inconspicuous, and only its queer whistling call proclaiming it kin to the birds rather than to the little marsh people, — the musk-rats, frogs, or turtles. Presently it walked out along the edge of the bog with a funny bobbing motion of its short tail, and stood revealed to us. Too small for a least bittern, it yet followed somewhat the same lines and coloring; but here the resemblance ended, for the method of locomotion was quite different. At every few strides it ducked its head into the slime, bringing out some invisible dainty, which it swallowed with great eagerness. A catch of what looked to be a crab caused me to move suddenly, and instantly the bird was skimming over the water, half flying, half swimming, uttering a shrill alarm call until

it disappeared. Not so the alarm call. For an indescribable medley of sounds arose on all sides, — whistles, squeals, squawks, — and then a silence as sudden as the alarm had been. Thinking there might be a nest near by, we at once punted to the spot where we had first seen the bird, and which seemed somewhat solid; then, wading out to a hump that would bear his weight, my companion looked eagerly about.

Must we confess that good fortune and not science had led him to the right place, and there, not two feet away, was the nest. Of the six eggs all were hatched but one, and the nest was yet warm, showing how recently it had been occupied. Diligent search failing to reveal any trace of the newly hatched "chicks," we pushed out into the open and lay down in the boat to await further developments. "All things come to those who wait," but in the study of wild life, whether of forest or marsh, the one essential seems to be patience in waiting,— long and *silent* waiting. The sun had long since passed the meridian, and the cool shadows gathering beneath the tall rice warned us that the day was waning, when suddenly the long silence was broken by the same peculiar noises as before. Confused as to the direction of their source, we knew not where to look, when on a point of rush-covered mud flat that separated two channels, we saw five or six tiny downy chicks of a glossy black, with funny large feet and necks too long for their fat little bodies. Otherwise they looked exactly like bantam babies, and ran about in the same lively fashion as their farm-yard cousins, while a continual "peeping" noise confirmed the resemblance. Finally the mother emerged from the denser reeds, and strutted about with a queer mincing gait and self-satisfied air, very much as a motherly old hen might do. Once she forgot her dignity and ran post-haste for a bug, with her long neck stretched out and her legs propelling rather than supporting her body. Undoubtedly the male bird was the one who had uttered the strange cries, for the female was silent as long as we watched her.

To photograph this interesting family was obviously

impossible, both on account of the swaying screen of rushes which hid us, and the fading light. Just as we had decided to attempt the capture of at least one of the five babies, we heard human voices approaching. The rails heard also, and vanished so utterly and so silently that I wondered whether they had really been there at all. Vexatious as this interruption was, it aroused us to a sense of our "lost" condition, and, standing up to halloo, we saw the other boat pass within a few yards of us. No time was wasted in hesitation; we pushed out and followed them, joining heartily in the laugh at our own expense. It was, to be sure, a trifle humiliating to find that we really had not been lost at all, for we were in the main channel. When once out of the rushes and in the open water of the lake, we floated along the edge of the marsh until the scarlet and gold of the sunset changed to purple shadows which, in turn, became silvery mists beneath the moon. Weird sounds, made more ghostly by the hour and place, came ever from the waving wild rice, — suppressed grunts, sighs, and moans. One thought of the lost souls of Dante's Inferno, or of Poe's hideous imagery, —

> "They are neither man nor woman,
> They are neither brute nor human,
> They are ghouls."

The unknown became the supernatural, too mysterious for comfort, and in spite of the beauty of the night a strange sense of fear made one long to get away.

Early the next morning we went again to the vicinity of our adventure, hoping to catch sight of the little brood; but although the same queer noises were heard on all sides, we saw nothing of the rails. Rowing around a floating bog, we came suddenly upon a least bittern, who instantly stiffened into statute-like imitation of his surroundings, and trusted to his protective coloring to escape notice. As we pushed toward him, and he knew he was discovered, he retreated through the rushes with the strangest gymnastics. Grasping a reed stalk in each

foot, he strode rapidly from stalk to stalk, pausing once to look back over his shoulder, as it were. It was a most comical exit, and deserved the applause we dared not give.

Many times have we sought to solve the mystery of the marsh music, but always with small success, and our next adventure with the rails was in our own dooryard at Evanston. Looking out of my library window one September morning, I saw my small kitten driving a young rail before her by cuffing it gently, first with one paw and then with the other. The bird made no attempt to escape, but soon turned, faced the kitten, and, lying down on its back, fought with both feet and bill. The effect was as ridiculous as if a small boy should turn at bay and make faces at a tormenting bully, and surprised the kitten into a momentary cessation of the play, — for such it was, without any idea of catching the bird. The latter allowed me to pick it up, and appeared neither exhausted nor frightened. It was an immature specimen, and became tame at once. In order to have even a moderately clear day for photographing him, we were obliged to keep him in durance vile for three weeks, on a diet of snails, ants' eggs, and hens' eggs hard boiled. Several times he escaped, and was recaptured without difficulty. When the day of his final release came, we took him to the outskirts of a prairie, and he flew farther and more vigorously than he ever had flown before, thereby proving his good health under captivity.

THE BIRDS OF COBB'S ISLAND, VIRGINIA.

BY

T. GILBERT PEARSON.

EXTENDING along the coast of Virginia is a series of flat grassy islands, many of them so low as to be covered with water at high tide. Among those high enough to be safe from ordinary overflow is Cobb's Island, a long sand bank which at flood tide is only a few feet above water. In the Autumn of 1896 this island was partially washed away during a storm. Previous to this it was seven miles in length, while in width it exceeded scarcely an eighth of a mile. On its eastern side the ocean broke continuously along the entire length. Stretching along the western shore for perhaps half the distance was a marsh.

Among the matted clusters of marsh grass on this island the beautiful laughing gulls found a summer home. In the spring of the year they came over the sea from the South, many scores in number, and here built their bulky nests. In order to reach them I once put on high rubber boots and waded out into the marsh. There was no difficulty in finding the large piles of grass which served as nests, situated only a foot or two above the water. In each of those examined either two or three large spotted eggs were found. On my first approach to the breeding grounds several of the birds were observed flying along the beach just outside the surf, but only one or two were hovering over the marsh. However, annoyed by my presence they soon came flying about overhead, filling the air with their cries of distress and uneasiness.

This summer gull is a pretty creature. Its head and the quills of its wings are black, the neck and under parts snowy white, and the feathers of its back are pearl gray. It has feet webbed suitable for swimming, and can ride at will upon the waves like a cork.

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1.—Grackle; so called from the sound it makes, "gra-gra."

2.—Screech Owl.

3.—Bob-o-Link; male and female.

4.—The Northern Shrike or Butcher Bird.

5.—Tern feeding its young.

From the beach an observer might regard the gulls as the only inhabitants of the marsh. But let him once start through it and he will change his mind. Clapper rails, sometimes termed "marsh hens," called constantly to each other from their hidden retreats in the grass. At times some of them must have been within a few yards of where I stood, but so carefully were they concealed in their covered runways beneath the grass, and so closely did the markings of their feathers resemble their surroundings, that, although a dozen of the birds would often be calling near at one time, I was unable to catch sight of a single one. A few of their nests were found. Some of these held as many as twelve spotted eggs, although the most of those examined had been deserted by the young.

The clapper rail is about fifteen inches in length, including its short excuse for a tail. Its body is very slender, which makes it admirably adapted for threading its way through the labyrinthian pathways of its marshy haunts. Its legs are slim and the bird is a good runner. It can also swim with ease. It is a poor flyer and as a result seldom takes to wing. Hunters sometimes set the marsh on fire to start the birds from cover. Then when they rise and fly slowly along in their awkward manner they present a target not easily missed even by an amateur sportsman.

Members of the rail family are found in many parts of the world, and everywhere they are the same excellent runners and poor flyers. On the Mascarene Islands there once lived a rail which stood seven feet high. Its feathers had brilliant hues and were much sought by sailors who chanced now and then to land on the islands. So the natives hunted the birds far and wide to get the feathers for barter. Such a war was waged that in the end they were entirely exterminated. The last one is supposed to have perished over two hundred years ago.

Cobb's Island, at the time of my visit in June, was the home of many birds of the sea. On a strip of sandy beach well up from the reach of the waves the beautiful long

winged sea swallows, or terns, had their homes. With them were also associated the black skimmers. These are birds which, with long knife-like bills, skim their food from the waves as they wander along the seacoast. From the habit of coming close to shore during bad weather they are often called by the fishermen "storm-gulls." "Shear-water" is also a popular name in some localities.

One of the prettiest sights of the coast is a tern; in fact, no ocean view is complete without one. Beautifully balancing on wings of pearl he comes floating down the wind as lightly as a fragment of cloud might drift before the breeze. In flight he has the perfection of movement and the embodiment of grace. What human eye can mark his course and not feel the æsthetic thrill that ever stirs the mind when in the presence of one of Nature's master-pieces? His bright eye catches the sunlight glint on the scales of a fish among the tossing waves and swift as an arrow he strikes headlong into the deep. The downward plunge is as sudden as it is swift and seldom does the bird miss his mark.

Sea birds are possessed of great curiosity regarding any strange object they may chance upon in their wanderings. I have seen gulls hover and scream for half an hour over an old basket awash in the surf. Half way along the ocean side of Cobb's Island lay a broken fishing boat where it had been carried and left by some high tide. The long brown roll of dried sea weed extending along the beach and marking the high water line crossed the spot where the boat lay and partially filled it.

I climbed into this boat one afternoon and lay down on my back to see what the birds would have to say when they saw me. Within five minutes I heard a dry high-pitched squeak and, moving my hat slightly, saw a tern thirty or forty feet above looking down at me. How his little yellow eyes did glisten with curiosity! In another moment he fell off before the wind, but soon came back, slowly balancing along against the breeze. Again and again his squeaky cry was uttered. Then another tern

appeared, and soon a gull joined them. Within fifteen minutes a dozen gulls and more than one hundred terns were flying about, all making a great outcry at the strange figure in the boat. Any movement on my part was a signal for a louder outburst of sounds as the birds rose higher or hurried away only to return a minute later to hover and stare and scream as before. Not until I arose and walked away were they satisfied to leave the spot where had lain the strange creature which had excited them so much.

Many observers agree that twenty years ago countless thousands of tern annually gathered at Cobb's Island to lay and hatch their eggs. Fishermen told me that bushels of eggs could then be gathered in a few hours' search, and that it was almost impossible to walk along the beach without crushing them. People frequently visited the island to gather eggs to eat. While thus engaged the birds would flock about the heads of the intruders with deafening cries, trying to drive them from the beach.

If one of the birds was shot and disabled, dozens of others would gather about the unfortunate comrade with loud notes of distress. Nor would they be frightened away by the repeated discharges of the guns, but would continue to fly excitedly about while one by one they fell bleeding to the ground.

So easily may terns be killed during the nesting season, and so pretty are the silver-gray feathers of their wings, that milliners learned that here was a profitable field for investment. Accordingly hunters were employed to go to the nesting places and shoot the birds. The skins were shipped to the great cities and there made into trimmings for ladies' hats. Ten thousand skins were gathered at Cobb's Island in a single season. All along the coast from Maine to Florida and around the shores of the Gulf of Mexico as far as Texas the hunting was carried on.

Expeditions were fitted out each summer for collecting the birds. Hunters would take a sailing vessel, provide

food and ammunition in sufficient quantity to last them for several weeks, and setting sail would cruise from island to island in search of the birds. Upon reaching a beach inhabited by terns the vessel would be brought to anchor, and here the crew would stay shooting and skinning as long as the occupation continued profitable, which was usually until the birds were all dead or driven away.

By 1890 the numbers of the terns along the Atlantic coast of the Southern States had become so depleted that many of the annual expeditions of the feather gatherers were discontinued. Individual hunters here and there still seek out the few remaining breeding places of the sea swallows and keep up the work of extermination.

One day I stood upon the deck of a two-masted sharpie lying at anchor in Bogue Sound on the North Carolina coast. I was talking to an old man whose long thin hair fell in waves on his shoulders. He was a professional bird hunter and in the captain's cabin near which we stood had, with a companion, skinned many thousands of sea birds. "I have hunted the terns in their nesting places," he said, "from New England southward to the West Indies, and I do not believe there is a rookery in all this line of coast that I have not repeatedly visited." He had shipped, he told me, more than one hundred thousand skins.

One of the most attractive of the tern family is the small variety known as the least tern. Once they lived by thousands along our coast, but now the birds are rarely seen. I asked the old feather hunter where these might be found nesting, and he replied, "I doubt if there will be a least tern's egg laid this summer within two hundred miles of here."

Before me stood an old man whose eyes had become dim through a life spent in contending with waves, and wandering over the blistering sands of summer beaches. He had never been taught to love and protect the birds, and by killing them he had seen a chance to win his bread. Is he the one to blame for the death of the terns?

The destruction of so many sea birds at length drew

public attention, and several States, now when it was almost too late, passed laws for their protection. On some of the islands along the New England coast inhabited by terns, wardens are stationed whose business it is to keep off intruders. Thus protected the birds in a few places are once more increasing in numbers. Societies for the protection of birds have been formed in many parts of the country and their efforts to arouse interest in bird study and prevent the wearing of bird feathers have met with much success.

But these movements came too late to save the terns of Cobb's Island. Almost as if by magic the vast rookery was destroyed, and as though Nature wished to forget the scene of such bloodshed and suffering, the storm king roared down upon its beaches one autumn, and now nothing is left but a mere strip of sand barely half a mile in length.

BIRDS' WINTER BEDS.

BY

DALLAS LORE SHARP.

"The owl, for all his feathers, was a-cold."

A STORM had been raging from the north-east all day. Toward evening the wind strengthened to a gale, and the fine, icy snow swirled and drifted over the frozen fields.

I lay a long time listening to the wild symphony of the winds, thankful for the roof over my head, and wondering how the hungry, homeless creatures out of doors would pass the night. Where do the birds sleep such nights as this? Where in this bitter cold, this darkness and storm, will they make their beds? The lark that

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broke from the snow at my feet as I crossed the pasture this afternoon —

> What comes o' thee?
> Whar wilt thou cow'r thy chittering wing,
> An' close thy e'e?

The storm grew fiercer; the wind roared through the big pines by the side of the house and swept hoarsely on across the fields; the pines shivered and groaned, and their long limbs scraped over the shingles above me as if feeling with frozen fingers for a way in; the windows rattled, the cracks and corners of the old farm-house shrieked, and a long, thin line of snow sifted in from beneath the window across the garret floor. I fancied these sounds of the storm were the voices of freezing birds, crying to be taken in from the cold. Once I thought I heard a thud against the window, a sound heavier than the rattle of the snow. Something seemed to be beating at the glass. It might be a bird. I got out of bed to look; but there was only the ghostly face of the snow pressed against the panes, half-way to the window's top. I imagined that I heard the thud again; but, while listening, fell asleep and dreamed that my window was frozen fast, and that all the birds in the world were knocking at it, trying to get in out of the night and storm.

The fields lay pure and white and flooded with sunshine when I awoke. Jumping out of bed, I ran to the window, and saw a dark object on the sill outside. I raised the sash, and there, close against the glass, were two quails — frozen stiff in the snow. It was they I heard the night before fluttering at the window. The ground had been covered deep with snow for several days, and at last, driven by hunger and cold from the fields, they saw my light, and sought shelter from the storm and a bed for the night with me.

Four others, evidently of the same covey, spent the night in the wagon-house, and in the morning helped themselves fearlessly to the chickens' breakfast. They roosted with the chickens several nights, but took to the fields again as soon as the snow began to melt.

It is easy to account for our winter birds during the day. Along near noon, when it is warm and bright, you will find the sparrows, chickadees, and goldfinches searching busily among the bushes and weeds for food, and the crows and jays scouring the fields. But what about them during the dark? Where do they pass the long winter nights?

Why, they have nests, you say. Yes, they *had* nests in the summer, and then, perhaps, one of the parent birds may be said to have slept in the nest during the weeks of incubation and rearing of the young. But nests are cradles, not beds, and are never used by even the young birds from the day they leave them. Muskrats build houses, foxes have holes, and squirrels sleep in true nests; but of the birds it can be said, "they have not where to lay their heads." They sleep upon their feet in the grass, in hollow trees, and among the branches; but, at best, such a bed is no more than a roost. A large part of the year this roost is new every night, so that the question of a sleeping-place during the winter is most serious.

The cheerful little goldfinches, that bend the dried ragweeds and grass-stalks down and scatter their chaff over the snow, sleep in the thick cedars and pines. These warm, close-limbed evergreens I have found to be the lodging-houses of many of the smaller winter birds — the fox-colored sparrow, snowbird, crossbill, and sometimes of the chickadee, though he usually tucks his little black cap under his wing in a woodpecker's hole.

The meadow-larks always roost upon the ground. They creep well over the grass, or, if the wind is high and it snows, they squat close to the ground behind a tuft of grass or thick bush and sleep while the cold white flakes fall about them. They are often covered before the morning; and when housed thus from the wind and hidden from prowling enemies, no bird could wish for a cozier, warmer, safer bed.

But what a lonely bed it is! Nothing seems so utterly homeless and solitary as a meadow-lark after the winter

nightfall. In the middle of a wide, snow-covered pasture one will occasionally spring from under your feet, scattering the snow that covered him, and go whirring away through the dusk, lost instantly in the darkness — a single little life in the wild, bleak wilderness of winter fields!

Again, the grass is often a dangerous bed. On the day before the great March blizzard of 1888, the larks were whistling merrily from the fences, with just a touch of spring in their call. At noon I noted no signs of storm, but by four o'clock — an hour earlier than usual — the larks had disappeared. They rose here and there from the grass as I crossed the fields, not as they do when feeding, far ahead of me, but close to my feet. They had gone to bed. By early evening the snow began to fall, and for two days continued furiously.

A week later, when the deep drifts melted, I found several larks that had perished from cold or starvation or had smothered under the weight of snow.

There is something of awe in the thought of a bird nestling close beneath a snow-laden bush in a broad meadow, or clinging fast to a limb in the swaying top of some tall tree, rocked in its great arms through the night by a winter gale. All trees, even the pines and cedars, are fearfully exposed sleeping-places, and death from cold is not infrequent among the birds that take beds in them.

The pine barrens, and especially certain pine clumps along Cohansey Creek and at the head of Cubby Hollow, used to be famous crow-roosts. Thousands of the birds, a few years ago, frequented these pieces of wood in the winter. About the middle of the afternoon, during the severest weather, they began to fly over to the roost at the head of the Hollow, coming in from the surrounding fields, some of them from miles away, where they have been foraging all day for food. You can tell the character of the weather by the manner of their flight. In the fall and spring they went over cawing, chasing each other and performing in the air; they were happy, and life was as abundant as the spring promise or the autumn fullness

everywhere. But in January the land is bare and hard, and life correspondingly lean and cheerless. You see it in their heavy, dispirited flight; all their spring joyousness is gone; they pass over silent and somber, reluctant to leave the fields, and fearful of the night. There is not a croak as they settle among the pines — scores, sometimes hundreds of them, in a single tree.

Here, in the swaying tops, amid the heavy roar of the winds, they sleep. You need have no fear of waking them as you steal through the shadows beneath the trees. The thick mat of needles or the sifted snow muffles your footfalls; and the winds still the breaking branches and snapping twigs. What a bed in a winter storm! The sky is just light enough for you to distinguish the dim outlines of the sleepers as they rock in the waves of the dark green that rise and fall above you; the trees moan, the branches shiver and creak, and high above all, around and beneath you, filling the recesses of the dark wood rolls the volume of the storm.

But the crows sleep on, however high the winds. They sit close to the branches, that the feathers may cover their clinging feet; they tuck their heads beneath their wing-coverts, thus protecting the whole body, except one side of the head, which the feathers of the wing cannot quite shelter. This leaves an eye exposed, and this eye, like the heel of Achilles, proves to be the one vulnerable spot. It freezes in very severe weather, causing a slow, painful death. In the morning, after an unusually cold night, you can find dozens of crows flapping piteously about in the trees of the roost and upon the ground, with frozen eyes. In January, 1895, I saw very many of them along the Hollow, blind in one eye or in both eyes, dying of pain and starvation. It was pitiful to see their sufferings. The snow in places was sprinkled with their broken feathers, and with pine-needles which they had plucked off and tried to eat. Nothing could be done for the poor things. I have tried time and again to doctor them; but they were sure to die in the end.

Who has not wondered, as he has seen the red rim of

the sun sink down in the sea, where the little brood of Mother Carey's chickens skimming round the vessel would sleep that night? Or who, as he hears the *honking* of geese overhead in the darkness, has not questioned by what

> . . . plashy brink
> Of weedy lake, or marge of river wide,
> Or where the rocking billows rise and sink
> On the chafed ocean-side,

they will find rest?

In winter, when a heavy southeast wind is blowing, the tides of Delaware Bay are high and the waters very rough. Then the ducks that feed along the reedy flats of the bay are driven into the quieter water of the creeks, and at night fly into the marshes, where they find safe beds in the "salt-holes."

The salt-holes are sheets of water having no outlet, with clean perpendicular sides as if cut out of the grassy marsh, varying in size from a few feet wide to an acre in extent. The sedges grow luxuriantly around their margins, making a thick, low wall in winter, against which the winds blow in vain. If a bird must sleep in the water, such a hole comes as near to being a perfect cradle as anything could be, short of the bottom of a well.

The ducks come in soon after dark. You can hear the whistle of their wings as they pass just above your head, skimming along the marsh. They settle in a hole, swim close up to the windward shore, beneath the sedges, and, with their heads under their wings, go fast asleep. And as they sleep the ice begins to form — first, along their side of the hole, where the water is calmest; then, extending out around them, it becomes a hard sheet across the surface.

A night that will freeze a salt-hole is not one in which there is likely to be much hunting done by man or beast. But I have been on the marshes such nights, and so have smaller and more justified hunters. It is not a difficult feat to surprise the sleeping ducks. The ice is half an inch thick when you come up, and seals the hole com-

pletely, save immediately about the bodies of the birds. Their first impulse, when taken thus at close range, is to dive; and down they go, turning in their tracks.

Will they get out? One may chance to strike the hole which his warm body kept open, as he rises to breathe; but it is more likely that he will come up under the ice, and drown. I have occasionally found a dead duck beneath the ice or floating in the water of a salt-hole. It had been surprised, no doubt, while sleeping, and, diving in fright, was drowned under the ice, which had silently spread like a strange, dreadful covering over its bed.

Probably the life of no other of our winter birds is so full of hardship as is that of the quail, Bob White.

In the early summer the quails are hatched in broods of from ten to twenty, and live as families until the pairing season the next spring. The chicks keep close to the neighborhood of the home nest, feeding and roosting together, under the guidance of the parent birds. But this happy union is soon broken by the advent of the gunning season. It is seldom that a bevy escapes this period whole and uninjured. Indeed, if *one* of the brood is left to welcome the spring it is little else than a miracle.

I have often heard the scattered, frightened families called together after a day of hard shooting; and once, in the old pasture to the north of Cubby Hollow, I saw the bevy assemble.

It was long after sunset, but the snow so diffused the light that I could see pretty well. In climbing the fence into the pasture, I had started a rabbit, and was creeping up behind a low cedar, when a quail, very near to me, whistled softly, *Whirl-ee!* The cedar was between us. *Whirl-ee, whirl-ee-gig!* she whistled again.

It was the sweetest bird-note I ever heard, being so low, so liquid, so mellow that I almost doubted if Bob White could make it. But there she stood in the snow with head high, listening anxiously. Again she whistled, louder this time; and from the woods below came a faint answering call: *White!* The answer seemed to break a spell; and on three sides of me sounded other calls. At this the little signaler repeated her efforts, and each time

the answers came louder and nearer. Presently something dark hurried by me over the snow and joined the quail I was watching. It was one of the covey that I had heard call from the woods.

Again and again the signal was sent forth until a third, fourth, and finally a fifth were grouped about the leader. There was just an audible twitter of welcome and gratitude exchanged as each new-comer made his appearance. Once more the whistle sounded; but this time there was no response across the silent field.

The quails made their way to a thick cedar that spread out over the ground, and, huddling together in a close bunch under this, they murmured something soft and low among themselves and — dreamed.

Some of the family were evidently missing, and I crept away, sorry that even one had been taken from the little brood.

THE MOCKING BIRD.

BY

T. Gilbert Pearson.

WHAT the nightingale is to Southern Europe the mocking bird is to the Southern States, the most wonderful song bird of the country and the universal favorite of the people. His reputation as a musician is world wide. Whoever hears his song is deeply impressed, and wherever the story of the birds is told, the power of the mocking bird's voice is recalled. He is one of the first in the spring to sing; indeed, I have heard him near the northern border of his range, singing with great force on a clear February morning when ice covered the trees as a garment.

In those States which border on the Gulf of Mexico the mocking birds are in full song by March first. In that

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semi-tropical climate they abound, and in many sections are the most abundant species. I have sometimes thought that they must be conscious of the power of their numbers from the bold, defiant manner in which the music will often come from a dozen or more throats within hearing at one time, drowning in its volume the notes of all other denizens of the fields and shrubbery. The bird revels in the glory of his vocal strength, and shouts his ringing challenge to the trees, the flowers, the very sky itself.

Watch the mocking bird some spring morning as with ruffled feathers and drooping wings he sits on the topmost bough of a neighboring tree and pours out the beautiful story of his love. At times the very intensity of the music within his breast lifts him many feet into the air. With dangling legs and carelessly flopping wings he drops again to his perch, singing the while. Anon he descends to the earth for a moment, a few rapid hops in the grass and he bounds again into the air with scarcely an intermission in his song. Music high and low, loud and soft, hilarious and sad, with never a hesitation, never a false note, is what falls to your ears as you hearken to this wonderful, masterful fellow, the music-prince of the southern highways and groves.

However, it is at night that the mocking bird is at his best. If he is the music-prince of the grove by day, he is the song-king of the lawn by night. When all the world is hushed save the faint murmur of distant pines, and the gentle gales are freighted with the odor of orange blossoms, the song of the mocking bird, softened by the mellow moonlight, floats to one's ears as a message of exquisite loveliness, like the sound of a beloved voice from the silent past.

Besides his native song, the mocking bird has the wonderful power of acquiring by practice the notes of many of the feathered forms he is accustomed to hear. He imitates the songs of the robin and wood thrush, the bluebird and the wren. With wonderful distinctness he will give the clear whistle of the cardinal grosbeak. In

regions where the little sparrow hawk is a common resident many mockers can reproduce its cry so perfectly as to deceive the most trained ear. Not all mocking birds have equal power of imitation. The gift of mocking in different individuals seems to vary quite as much as the range of their natural song. An observer in South Carolina speaks of hearing one mimic the notes of no less than thirty-two birds during an interval of ten minutes.

The nest of the mocking bird is variously situated, in small trees, brush heaps, briers, in the corners of rail fences, in the decayed trunks of trees, on stumps, in piles of cord wood, and at times in vines growing about the doors and verandas of our houses. Once I found a nest between the wall and the stick-and-clay chimney of a ruined negro cabin. The nesting material consists of twigs, plant stems, dry grasses, pieces of paper, strings, strips of bark, feathers, rags or other suitable articles which can easily be secured. The structure is generally lined with rootlets. The distance at which the nest is placed above the ground varies from three to ten feet. Rarely one may be seen elevated fifty feet in the air on the bough of a large tree.

The eggs have a pale greenish blue ground-color and are covered quite uniformly with reddish brown spots. Four is the number generally laid in a nest, sometimes five, and rarely six. The one profession of the male in the spring is singing, and so completely does this engross his mind that to his mate is left the entire responsibility of constructing their habitation and hatching the eggs. May is the principal month for nesting, although I have seen mocking birds incubating their eggs as far north as Ocracoke Inlet by April tenth. In the southern part of its range two broods are reared in a season.

While engaged in incubation or caring for the young, the nest is guarded with the utmost care. The parents will not hesitate to attack any enemy, real or imaginary, which may approach their domain, be it crow, or dog, or man. If they do not actually assail they will at least approach near and scold soundly. Their cry of

alarm at once warns other birds in the vicinity of approaching danger. If the intruder be a hawk the cry is taken up and passed from garden to garden by these self-appointed sentinels, and the evil news of its approach is heralded faster than the winged desperado can fly.

If a mocking bird's nest be destroyed the mother bird will, within a few days, begin building a new one. If an accident likewise befalls this, still another will be built. A pair once made their nest among the rails of a fence near my home. The owner of the fence soon afterward, while making some repairs about the lot, accidently tore the nest from its position and the eggs were broken. The bird then built in a small oak tree near by, but an animal in the pasture rubbed the tree down and the birds were again without a home.

In their search for a more secure position the distressed mockers sought the protection of a large orange tree, and, on a horizontal limb ten feet from the ground, built a nest. Here more trouble awaited them, for a cat climbed the tree, despite the thorns, and ate the young in the nest. If the poor birds were discouraged by this series of disasters they did not show it by their actions. A week after this last catastrophe I saw the female carrying twigs in among the dagger shaped leaves of a Spanish bayonet plant. Here at last she found a sure retreat and reared her young in safety, free alike from the intrusions of man, and ox, and cat.

If kindly treated this bird will ofttimes become very, trustful, and if you are so fortunate as to have trees and shrubbery about your house, he will perch in your doorway and even hop about your room. I knew one which often did this until one day a heavy hand was laid upon him and he was placed in a cage. But the moment he was imprisoned his tameness vanished. He refused all food and dashed wildly against the cruel bars. And O, how long and untiringly he sought his freedom!

Outside he could hear the buzzing of a humming bird's wings among the woodbine on the veranda trellis. He heard, too, the twitter of swifts as they circled and

darted about the sky, and again and again the songs and calls of his fellows reached his ears, as they chased each other about the grove in their mimic combats. In his efforts to escape he drove his bill continually between the bars of the cage, until his head was bleeding from many bruises. At times he called loudly for help, and was never content a moment until his wings bore him once more into the bright sunshine, for like most wild creatures that have grown to maturity in the free air, he could never be taught to live in captivity.

A friend of mine once picked up a young mocking bird which had been injured and kindly cared for it. She placed it in a cage and fed it for a time with ripe berries and a mixture of boiled egg and potato. Later when it was able to fly it was given its liberty. Instead of leaving, it followed her about the house, hopping and flying along the floor. It would light on her arm and feed from her hand. If she was out of its sight for an hour it would become uneasy, and entering the house by door or window, would seek her from room to room, chirping loudly in distressed tones. For many weeks the bird remained about the house and lawn, and would come when called by his mistress.

Unfortunately for their preservation, mocking birds when taken while young will, with proper care, thrive in captivity. This power of adaptability to cage life is proving its destruction. Thousands of young are collected each year and placed in cages. Of the small per cent of these captives which survive the first few months of their imprisonment, numbers are shipped to Northern cities and sold. In many communities mocking birds are rapidly becoming exterminated, owing to the treatment which they receive from the hands of the very beings whom they so constantly aid by destroying countless millions of harmful insects. Some of the fruit growers shoot the birds because they choose to sample now and then the fruit which they have helped to raise.

Once I knew a man, who, along with his other occupations, was a grape grower in a small way. He could not

"abide" a mocking bird, he declared, "they ate his grapes so much." He shouted, and waved blankets, and hung up bright pieces of tin to frighten them away, but the birds continued to fill their stomachs with fruit and the farmer with wrath.

"One of those pesky little rascals will come," he said, "and go to work on the finest bunch of grapes he can find. He will bite a hole in one, and stick his bill in another, and keep on that way until he has ruined the whole bunch. Then he will jump up on top of the vine somewhere and shout and sing as though he had done something mighty smart and wanted everybody to know it. And the woodpeckers are about as bad," he added.

So at length the exasperated husbandman put a gun into the hands of his son and offered him a reward of two cents a head for all these birds he would kill within a radius of a mile. And the boy hunted and killed to his heart's content with all the glee of a young savage. Within a week he had shot sixty-five mocking birds, eighteen woodpeckers, seven shrikes, and a pair of kingbirds. In some surprise I asked why he had killed the kingbirds and shrikes.

"I have seen the kingbirds catching our bees," he explained, "and those loggerheads, I don't like them and just hate to have them about."

There were other grape growers in the country, and I asked one of these what he did to keep the mocking birds from eating his grapes.

"O, that's easy enough!" he answered. "When the grapes begin to ripen I inclose each bunch in a paper bag and tie the mouth of the bag close about the stem. That keeps the birds from the grapes, and as they are in the dark I sometimes think they ripen more evenly than if left exposed. Shoot them! shoot a mocking bird?" he exclaimed, in answer to my suggestion, "why, I wouldn't think of such a thing, they catch too many insects and give me too much fine music to think of killing one. If I had no way of protecting my grapes," he continued, "I should plant more vines, so as to raise enough both for the birds and my own use."

Our mocking bird belongs to a famous family of singers, the brown thrasher and the catbird being his close relatives. Both of these birds are gifted mockers and excellent singers. The localities which mocking birds naturally inhabit are the growths of shrubbery along the borders of forests and swamps. They leave these places as soon as man comes into the wilderness, and flock to his gardens and orchards, as if to protect his trees, and cheer him with their songs. About the dwellings of the few inhabitants of stormy Cape Hatteras they are very abundant. One of the sweetest songs I have ever heard was that of a Cape Hatteras mocking bird, singing from the shelter of a holly bush one day while the wind was blowing a gale and the ocean rolled upon the wreck-strewn sands of the Cape.

BIRDS OF BALD PEAKS AND GREEN VALES.

BY

LEANDER S. KEYSER.

Mr. Keyser is a Lutheran clergyman in Ohio who has given much close study to Bird Life and has published some valuable contributions to our knowledge of that subject as well as some capital books of Bird Stories.

ONE of my chief objects in visiting the Rockies was to ascend Pike's Peak from Manitou, and make observations on the birds from the base to the summit. A walk one afternoon up to the Halfway House and back — the Halfway House is only about one-third of the way to the top — convinced me that to climb the entire distance on foot would be a useless expenditure of time and effort. An idea struck me: Why not ride up on the cog-wheel train, and then walk down, going around by some of the valleys and taking all the time needed for observations on the avifaunal tenantry? That was the plan pursued, and an excellent one it proved.

From "Birds of the Rockies." Copyright, 1902. By A. C. McClurg Company, Chicago. By permission.

When the puffing cog-wheel train landed me on the summit, I was fresh and vigorous, and therefore in excellent condition physically and mentally to enjoy the scenery and also to ride my hobby at will over the realm of cloudland. The summit is a bald area of several acres, strewn with immense fragments of granite, with not a spear of grass visible. One of the signal-station men asked a friend who had just come up from the plain, "Is there anthing green down below? I'd give almost anything to see a green patch of some kind." There was a yearning strain in his tones that really struck me as pathetic. Here were visitors revelling in the magnificence of the panorama, their pulses tingling and their feelings in many cases too exalted for expression; but those whose business or duty it was to remain on the summit day after day soon found life growing monotonous, and longed to set their eyes on some patch of verdure. To the visitors, however, who were in hale physical condition, the panorama of snow-clad ranges and isolated peaks was almost overwhelming. In the gorges and sheltered depressions of the old mountain's sides large fields of snow still gleamed in the sun and imparted to the air a frosty crispness.

When the crowd of tourists, after posing for their photographs, had departed on the descending car, I walked out over the summit to see what birds, if any, had selected an altitude of fourteen thousand one hundred and forty-seven feet above sea-level for their summer home. Below me, to the east, stretched the gray plains running off to the sky-line, while the foothills and lower mountains, which had previously appeared so high and rugged and difficult of access, now seemed like ant-hills crouching at the foot of the giant on whose crown I stood. Off to the southwest, the west, and the northwest, the snowy ranges towered, iridescent in the sunlight. In contemplating this vast, overawing scene, I almost forgot my natural history, and wanted to feast my eyes for hours on its ever-changing beauty; but presently I was brought back to a consciousness of my special vocation

by a sharp chirp. Was it a bird, or only one of those playful little chipmunks that abound in the Rockies? Directly there sounded out on the serene air another ringing chirp, this time overhead, and, to my delight and surprise, a little bird swung over the summit, then out over the edge of the cliff, and plunged down into the fearsome abyss of the "Bottomless Pit."

Other birds of the same species soon followed his example, making it evident that this was not a birdless region. Unable to identify the winged aeronauts, I clambered about over the rocks of the summit for a while, then slowly made my way down the southern declivity of the mountain for a short distance. Again my ear was greeted with that loud, ringing chirp, and now the bird uttering it obligingly alighted on a stone not too far away to be seen distinctly through my binocular. Who was the litle waif that had chosen this sky-invading summit for its summer habitat? At first I mistook it for a horned lark, and felt so sure my decision was correct that I did not look at the bird as searchingly as I should have done, thereby learning a valuable lesson in thoroughness. The error was corrected by my friend, Mr. Charles E. Aiken, of Colorado Springs, who has been of not a little service in determining and classifying the avian fauna of Colorado. My new-found friend (the feathered one, I mean) was the American pipit, which some years ago was known as the tit-lark.

"Te-cheer! te-cheer! te-cheer!" (accent strong on the second syllable) the birds exclaimed in half-petulant remonstrance at my intrusion as I hobbled about over the rocks. Presently one of them darted up into the air; up, up, up, he swung in a series of oblique leaps and circles, this way and that, until he became a mere speck in the sky, and then disappeared from sight in the cerulean depths beyond. All the while I could hear his emphatic and rapidly repeated call, "Te-cheer! te-cheer!" sifting down out of the blue canopy. How long he remained aloft in "his watch-tower in the skies" I do not know, for one cannot well count minutes in such exciting circum-

stances, but it seemed a long time. By and by the call appeared to be coming nearer, and the little aeronaut swept down with a swiftness that made my blood tingle, and alighted on a rock as lightly as a snowflake. Afterward a number of other pipits performed the same aerial exploit. It was wonderful to see them rise several hundred feet into the rarified atmosphere over an abyss so deep that it has been named the "Bottomless Pit."

The pipits frequently flitted from rock to rock, teetering their slender bodies like sandpipers, and chirping their disapproval of my presence. They furnished some evidence of having begun the work of nest construction, although no nests were found, as it was doubtless still too early in the season. In some respects the pipits are extremely interesting, for, while many of them breed in remote northern latitudes, others select the loftiest summits of the Rockies for summer homes, where they rear their broods and scour the alpine heights in search of food. The following interesting facts relative to them in this alpine country are gleaned from Professor Cooke's pamphlet on "The Birds of Colorado":

> In migration they are common throughout the State, but breed only on the loftiest mountains. They arrive on the plains from the South about the last of April, tarry for nearly a month, then hie to the upper mountain parks, stopping there to spend the month of May. By the first of June they have ascended above timber-line to their summer home amid the treeless slopes and acclivities. Laying begins early in July, as soon as the first grass is started. Most of the nests are to be found at an elevation of twelve thousand to thirteen thousand feet, the lowest known being one on Mount Audubon, discovered on the third of July with fresh eggs. During the breeding season these birds never descend below timber-line. The young birds having left the nest, in August both old and young gather in flocks and range over the bald mountain peaks in quest of such dainties as are to the pipit taste. Some of them remain above timber-line until October although most of them have by that time gone down into the upper parks of the mountains. During this month they descend to the plains, and in November return to their winter residence in the South.

While watching the pipits, I had another surprise. On a small, grassy area amid the rocks, about a hundred feet

below the summit, a white-crowned sparrow was hopping about on the ground, now leaping upon a large stone, now creeping into an open space under the rocks, all the while picking up some kind of seed or nut or insect. It was very confiding, coming close to me, but vouchsafing neither song nor chirp. Farther on I shall have more to say about these tuneful birds, but at this point it is interesting to observe that they breed abundantly among the mountains at a height of from eight thousand to eleven thousand feet, while the highest nest known to explorers was twelve thousand five hundred feet above the sea. One of Colorado's bird men has noted the curious fact that they change their location between the first and second broods — that is, in a certain park at an elevation of eight thousand feet they breed abundantly in June, and then most of them leave that region and become numerous among the stunted bushes above timber-line, where they raise a second brood. It only remains to be proved that the birds in both localities are the same individuals, which is probable.

On a shoulder of the mountain below me, a flock of ravens alighted on the ground, walked about awhile, uttered their coarse croaks, and then took their departure, apparently in sullen mood. I could not tell whether they croaked "Nevermore!" or not.

Down the mountain side I clambered, occasionally picking a beautiful blossom from the many brilliant-hued clusters and inhaling its fragrance. Indeed, sometimes the breeze was laden with the aroma of these flowers, and in places the slope looked like a cultivated garden. The only birds seen that afternoon above timber-line were those already mentioned. What do the birds find to eat in these treeless and shrubless altitudes? There are many flies, some grasshoppers, bumble-bees, beetles, and other insects, even in these arctic regions, dwelling among the rocks and in the short grass below them watered by the melting snows.

At about half-past four in the afternoon I reached the timber-line, indicated by a few small, scattering pines

and many thick clumps of bushes. Suddenly a loud, melodious song brought me to a standstill. It came from the bushes at the side of the trail. Although I turned aside and sought diligently, I could not find the shy lyrist. Another song of the same kind soon reached me from a distance. Farther down the path a white-crowned sparrow appeared, courting his mate. With crown-feathers and head and tail erect, he would glide to the top of a stone, then down into the grass where his lady-love sat; up and down, up and down he scuttled again and again. My approach put an end to the picturesque little comedy. The lady scurried away into hiding, while the little prince with the snow-white diadem mounted to the top of a bush and whistled the very strain that had surprised me so a little while before, farther up the slope. Yes, I had stumbled into the summer home of the white-crowned sparrow, which on the Atlantic coast and the central portions of the American continent breeds far in the North.

It was not long before I was regaled with a white-crown vesper concert. From every part of the lonely valley the voices sounded. And what did they say? "Oh, de-e-e-ar, de-e-ar, Whittier, Whittier," sometimes adding, in low, caressing tones, "Dear Whittier" — one of the most melodious tributes to the Quaker poet I have ever heard. Here I also saw my first mounted bluebird, whose back and breast are wholly blue, there being no rufous at all in his plumage. He was feeding a youngster somewhere among the snags. A red-shafted flicker flew across the vale and called, "Zwick-ah! zwick-ah!" and then pealed out his loud call just like the eastern yellow-shafted high-holder. Why the Rocky Mountain region changes the lining of the flicker's wings from gold to crimson — who can tell? A robin — the western variety — sang his "Cheerily," a short distance up the hollow, right at the boundary of the timber-line.

About half-past five I found myself a few hundred feet below timber-line in the lone valley, which was already beginning to look shadowy and a little uncanny, the tall

ridges that leaped up at the right obscuring the light of the declining sun. My purpose had been to find accommodations at a mountaineer's cabin far down the valley, in the neighborhood of the Seven Lakes; but I had tarried too long on the mountain, absorbed in watching the birds, and the danger now was that, if I ventured farther down the hollow, I should lose my way and be compelled to spend the night alone in this deserted place. I am neither very brave nor very cowardly; but, in any case, such a prospect was not pleasing to contemplate. Besides, I was by no means sure of being able to secure lodgings at the mountaineer's shanty, even if I should be able to find it in the dark. There seemed to be only one thing to do — to climb back to the signal station on the summit.

I turned about and began the ascent. How much steeper the acclivities were than they had seemed to be when I came down! My limbs ached before I had gone many rods, and my breath came short. Upward I toiled, and by the time my trail reached the cog-road I was ready to drop from exhaustion. Yet I had not gone more than a third of the way to the top. I had had no supper, but was too weary even to crave food, my only desire being to find some place wherein to rest. Night had now come, but fortunately the moon shone brightly from a sky that was almost clear, and I had no difficulty in following the road.

Wearily I began to climb up the steep cog-wheel track. Having trudged around one curve, I came to a portion of the road that stretched straight up before me for what seemed an almost interminable distance, and, oh! the way looked so steep, almost as if it would tumble back upon my head. Could I ever drag myself up to the next bend in the track? By a prodigious effort I did this at last — it seemed "at last" to me, at all events — and, lo! there gleamed before me another long stretch of four steel rails.

My breath came shorter and shorter, until I was compelled to open my mouth widely and gasp the cold, rare-

fied air, which, it seemed, would not fill my chest with the needed oxygen. Sharp pains shot through my lungs, especially in the extremities far down in the chest; my head and eye-balls ached, and it seemed sometimes as if they would burst; my limbs trembled with weakness, and I tottered and reeled like a drunken man from side to side of the road, having to watch carefully lest I might topple over the edge and meet with a serious accident. Still that relentless track, with its quartette of steel rails, stretched steep before me in the distance.

For the last half mile or more I was compelled to fling myself down upon the track every few rods to rest and recover breath. Up, up, the road climbed, until at length I reached the point where it ceases to swing around the shoulders of the mountain, and ascends directly to the summit. Here was the steepest climb of all. By throwing my weary frame on the track at frequent intervals and resting for five minutes, taking deep draughts of air between my parched lips, I at last came in sight of the government building. It is neither a mansion nor a palace, not even a cottage, but never before was I so glad to get a glimpse of a building erected by human hands. It was past nine o'clock when I staggered up to the door and rang the night bell, having spent more than three hours and a half in climbing about two miles and a half. Too weary to sleep, I tossed for hours on my bed. At last, however, "nature's sweet restorer" came to my relief, and I slept the deep sleep of unconsciousness until seven o'clock the next morning, allowing the sun to rise upon the Peak without getting up to greet him. That omission may have been an unpardonable sin, for one of the chief fads of visitors is to see the sun rise from the Peak; but I must say in my defence that, in the first place, I failed to wake up in time to witness the Day King's advent, and, in a second place, being on bird lore intent rather than scenic wonders, my principal need was to recruit my strength for the tramping to be done during the day. The sequel proved that, for my special purpose, I had chosen the wiser course.

By eight o'clock I had written a letter home, eaten a refreshing breakfast, paying a dollar for it, and another for lodging, and was starting down the mountain, surprised at the exhilaration I felt, in view of my extreme exhaustion of the evening before. I naturally expected to feel stiff and sore in every joint, languid and woebegone; but such was not the case. It is wonderful how soon one recovers strength among these heights. How bracing is the cool mountain air, if you breathe it deeply! As I began the descent, I whistled and sang, — that is, I tried to. To be frank, it was all noise and no music, but I must have some way of giving expression to the uplifted emotions that filled my breast. Again and again I said to myself, "I'm so glad! I'm so glad! I'm so glad!" It was gladness pure and simple, — the dictionary has no other word to express it. No pen can do justice to the panorama of mountain and valley and plain as viewed from such a height on a clear, crisp morning of June. One felt like exclaiming with George Herbert:

> "Sweet day, so cool, so calm, so bright,
> The bridal of the earth and sky!"

So far as the æsthetic value of it went, I was monarch of all I surveyed, even though mile on mile of grandeur and glory was spread out before me. The quatrain of Lowell recurred to my mind:

> "'Tis heaven alone that is given away,
> 'Tis only God may be had for the asking;
> No price is set on the lavish summer;
> June may be had by poorest comer."

Before leaving the Peak, I watched a flock of birds eating from the waste-heap at the Summit House. They were the brown-capped rosy finches, called scientifically *Leucosticte australis*. Their plumage was a rich chocolate, suffused over neck, breast, and back with intense crimson, while the pileum was quite black. With one exception — the white-tailed ptarmigan — they range the

highest in summer of all Colorado birds. They are never seen below timber-line in that season, and are not known to breed below twelve thousand feet; thence to the tops of the highest peaks they hatch and rear their young. In August old and young swarm over the summits picking edible insects from the snow, while in winter they descend to timber-line, where most of them remain to brave the arctic weather and its frequent storms.

Bidding a regretful goody-bye to the summit, for it held me as by a magician's spell, I hastened down the steep incline of the cog-wheel road, past Windy Point, and turning to the right, descended across the green slope below the boulder region to the open, sunlit valley which I had visited on the previous afternoon. It was an idyllic place, a veritable paradise for birds. Such a chorus as greeted me from the throats of I know not how many white-crowned sparrows, — several dozen, perhaps, — it would have done the heart of any lover of avian minstrelsy good to listen to. The whole valley seemed to be transfigured by their roundelays, which have about them such an air of poetry and old-world romance. During the morning I was so fortunate as to find a nest, the first of this species that I had ever discovered. Providence had never before cast my lot with these birds in their breeding haunts. The nest was a pretty structure placed on the ground, beneath a bush amid the green grass, its holdings consisting of four dainty, pale blue eggs, speckled with brown. The female leaped from her seat as I passed near, and in that act divulged her little family secret. Although she chirped uneasily as I bent over her treasures, she had all her solicitude for nothing; the last thing I would think of doing would be to mar her maternal prospects. As has been said, in this valley these handsome sparrows were quite plentiful; but when, toward evening, I clambered over a ridge, and descended into the valley of Moraine Lake, several hundred feet lower than the Seven Lakes valley, what was my surprise to find not a white-crown there! The next day I trudged up to the Seven Lakes,

and found the white-crowns quite abundant in the copses, as they had been farther up the hollow on the previous day; and, besides, in a boggy place about two miles below Moraine Lake there were several pairs, and I was fortunate enough to find a nest. Strange — was it not? — that these birds should avoid the copsy swamps near Moraine Lake, and yet select for breeding homes the valleys both above and below it. Perhaps the valley of Moraine Lake is a little too secluded and shut in by the towering mountains on three sides, the other places being more open and sunshiny.

The upper valley was the summer home of that musician *par excellence* of the Rockies, the green-tailed towhee, and he sang most divinely, pouring out his

> "full heart
> In profuse strains of unpremeditated art."

Having elsewhere described his minstrelsy and habits with more or less fulness, I need give him only this passing reference here. A little bird with which I here first made acquaintance was an elegant species known as Audubon's warbler, which may be regarded as the western representative of the myrtle warbler of the East. The two birds are almost counterparts. Indeed, at first I mistook the Audubon for the myrtle. The former has a yellow throat, while the latter's throat is white.

In all the upper mountain valleys, and on the steep slopes of the western as well as the eastern side of the Divide, I had the Audubon warblers often at my elbow. In summer they make their homes at an altitude of seven to eleven thousand feet, and are partial to pine timber; indeed, I think I never found them elsewhere, save occasionally among the quaking asps. I learned to distinguish Audubon's chanson from those of his fellow-minstrels. It is not much of a song — a rather weak little trill, with a kind of drawl in the vocalization that forms its diagnostic feature. The persistency with which it is repeated on the solitary pine-clad mountain sides constitutes its principal charm.

THE EARLY BIRDS.[1]

BY

LOUIS AGASSIZ FUERTES.

Mr. Fuertes is a well-known bird painter who has illustrated many of the more important bird-books which have appeared in recent years. His close and careful study of them for this purpose gives an especial value to his verbal descriptions.

AFTER a long winter, many of us are too impatient for spring to wait for the swelling of the buds, the opening of the early flowers, and the springing of the grass. Several weeks lie between the end of winter and the truly genial spring days, and during this interval we look for something to herald the settled spring season. And the thing which gives us that for which we are unconsciously looking, more than all other signs, is the arrival of the birds. Who has not warmed to the quavering call of the first blue-bird, or been suddenly thrilled some early spring day with the sunny notes of the song sparrow!

In the southern part of New York, notably in the lower Hudson Valley, the winter is spent by several birds which elsewhere we are accustomed to see only after the winter has passed. Among these are the blue-bird, robin, song-sparrow, white-throated-sparrow, meadow-lark, and possibly the purple-finch. But in most of the State we must wait until the first or second week in March before we can be sure of seeing any of them. It is a question which of the earlier birds will first make its appearance, as these early migrants are much less regular in their movements than those that come late in April and in May, after the weather has become settled. Many a robin and blue-bird arrives during some early warm

[1] From "Nature Study Leaflets." Published by The College of Agriculture, Cornell University, Ithaca, N. Y. J. B. Lyon Co., Albany. By permission.

" spell," to find himself suddenly surrounded by flying snow and blown about by cold winds. But these and a few other hardy ones seem able to stand such rebuffs with great equanimity, and the momentary shining of a fickle March sun will often evoke some pent-up song-sparrow's notes from the shelter of a hedge or thicket. Robins, blue-birds, song-sparrows, cowbirds, meadow-larks, phœbes, bronzed grackles, kingfishers, and doves may be looked upon as the vanguards of the hosts of migrating birds that come to us each year, and the first four or five may be expected almost any time after the first week in March. If the winter has been late, these may not appear until the middle or even the latter part of the month, in which case one is busy keeping track of the arrivals, as the other birds have caught up then, and all come nearly at the same time.

It is unnecessary to give detailed descriptions of robins, blue-birds, and song-sparrows, as nearly every-one is familiar with them; but some of the other early comers may be more easily recognized if some field impressions of them be given.

* * *

Almost any warm day in early March we may hear a thin, clear " tssss " in a high piping key, and on looking up see from one to five black birds, about the size of orioles, flying in a strange undulating manner — some up and some down, with the wings held close to their sides during the " drop " in their flight. They are cowbirds. The flock may swirl into the top of a tree and sit close together. If this happens within eyeshot, stop and watch them for a moment. One or two of the males are almost certain to utter the ridiculous song of the species, which, like that of their relatives, the grackles, is accompanied by the most grotesque of actions. The bird spreads its wings to their utmost, spreads and elevates the tail, stretches its neck upwards and forwards, and then, quivering and tottering, nearly falls forward off the perch. The only sound which accompanies this absurd

action is a faint chuckling "clk-sfs'k," which is scarcely to be heard a hundred feet away.

* * *

With the cowbirds we may expect the arrival of the bronzed grackles, which resemble them much in flight, but are larger and come in far larger flocks — sometimes ten, sometimes a hundred or more. Their arrival is known by the vigorous calls they utter while flying, a loud bass "jook." When seen squabbling in the spruce trees or in the bare branches of the willows fringing the streams, the males are likely to be giving their "song." It is scarcely more of a note than the cowbirds's, a rusty squeak, and it is accompanied by a contortion in the same manner. It is not such a pronounced effort, however, and is often only a slight shudder and shrug of the shoulders. They feed, like cowbirds, mostly on the ground, and walk about most sedately in the grass like small crows. In tall grass, however, they waddle too much to be graceful. When taking flight they spread their long pointed tails in a very peculiar and characteristic manner — not out in a horizontal plane, like most birds, but up at the sides in the shape of a gardener's trowel, which gives them an extraordinary appearance.

* * *

The redwings begin to come into the marshes soon after the grackles, and are at that time in full feather and song. Their rich, deliberate "clonk-ka lrrrrrrr," interlarded with the clear piping whistles of some of the flock, makes a concert of bird-notes very dear to all who are familiar with it. In their scarlet and black velvet dress these birds are impossible to mistake, whether seen chasing over the marshes, singing from an elm-top, or balancing with spread tail upon some tall reed stalk.

* * *

There is a bird-note so often and so justly mistaken for that of the phœbe that the error certainly merits correction. The spring song of the chick-a-dee (which

may be heard on almost any warm day all winter, and is very easy to call forth by even a poorly whistled imitation) is a clear, pure "eee eee" or "— —" which really says "Phœbe" much more plainly than the true phœbe note, this latter being much lower in tone, and only to be heard after March is well on, and almost always in the vicinity of running streams and brooklets; while the gay little chick-a-dee whistles at any time or place that suits his versatile fancy.

* * *

The mellow flute notes of the meadow larks float to us from the middle of some large, open field, and are among the most beautiful bits of bird music we ever hear. They are not to be represented by notes, and can only be most inadequately described. There is great variation in the sequence of notes, but all are beautifully clear and ringing, and have a decided tinge of what would be sadness if it were not so sweet. The bird flies in a very characteristic manner, never raising the wings above the plane of the back, and when seen below the horizon line always shows the white feathers in the tail. His saffron breast and black breastmark seldom show on the living birds, and the mottled brown back is a wonderful safeguard against his many overhead enemies.

* * *

Two or more doves may be seen winging their headlong flight through the air. These are among the swiftest of birds, and are generally out of eyeshot almost before you have seen them. (That is one way of knowing what they are.) In flight, they look like small pigeons with very long, graduated tails, and when, in some old orchard or open wood, you see one rise from the ground into a tree, the white lateral feathers in the tail make an easily recognizable mark. Their cooing notes are well known — a high-pitched "overtone," followed by several long bell-toned "oooo, — oooo," notes.

* * *

About April 1 to 10, you may hear a scratching in the

dead leaves among the underbrush in any thickly grown tangle, and upon cautiously coming up you may discover the authors — not big grouse as you may have supposed, but a flock of fine, vigorous fox-sparrows on their way to their northern breeding grounds. They are bright bay fellows, with boldly blotched brown and white breasts, diligently scattering the leaves for their food of seeds, spiders, ants, and various insects. If you have been fortunate enough not to have been seen you may hear their song, which is one of the finest of our sparrow songs, readily recognizable as such, though not resembling any of its fellows — a clear, vigorous carol, often ending abruptly with a rather unmusical "clip." If, however, they have seen you, you will be treated to a sharp "tseep!" and a rear view of a flock of rapidly retreating birds, for they are not sociable (with us, at least), and generally take a hint to move on before you know of their presence. They do not stay long with us on their migration, and seeing them one day is no indication that you can find them the next.

* * *

Although the white-throated sparrows spend the winter in our southern counties, they do not start their northward journey as early as we might expect, and it is not until the first part of April that we may be sure of finding them. I have one list, indeed that shows their first appearance on May first!

They are to be found in places similar to those which the fox-sparrows choose, and are very similar to them in habits, but the boldly striped head and gray breast are very distinctive marks. Almost all of our native sparrows have a call note, the "tsweep" note, which is hard to distinguish in the different species without much patient listening — and I doubt if any person is infallible in this distinction. The white-throat has this note, as well as the song-sparrow, tree-sparrow (a winter bird), fox-sparrow, white-crown, chippy, field-sparrow, grass-finch, in fact all our brown-backed sparrows. But the song of the white-throat is his own, and may be heard

frequently during his very leisurely journey through our state. His Canadian name, " Peabody bird " is descriptive of his notes, "—_.._.._.." When a number get together and whistle, as if they were singing a round, it makes a very sweet concert.

* * *

One of the foremost birds in the spring movement is the grass-finch (vesper-sparrow or bay-winged bunting). It is to be found in open fields and along roadside fences, in company with meadow larks, and its sweet song may be heard almost any warm evening after the middle of April. Unlike most of our birds, this sparrow sings at its best late in the afternoon and during twilight, which perhaps makes its song seem the sweeter. It is rather a gentle song, though to be heard at some distance, carrying quite as far as that of the song-sparrow. Although the quality of voice is somewhat similar in these two birds, the grass-finch lacks the merry abandon that characterizes the song-sparrow's song, but has instead a deeper chord, which is called by some people sadness. The bird may be easily recognized in the fields by the white tail-feathers, which always show in flight. It is about the size and general color of the song-sparrow.

* * *

By the time the foregoing birds are comparatively common, and the maple buds are bursting and the lilacs swelling, the gay purple finch appears. He is not purple at all, but has a crimson head, which fades on the lower breast through rosy pink into pure white. He is fond of spruces and larches, feeding greedily on the tender buds as well as on the ants and scale insects that infest them. His song is a fine one, and in addition to the charm of being poured forth in full flight, is so long and intricate that one finds himself holding his breath as the burst of melody continues, as if to help the little fellow catch up with his music.

* * *

Along the banks of some lake or stream, sitting idly on a telegraph pole or wire, rising and settling, elevating and depressing his long parted top-knot, a patriarchal old kingfisher may be seen silently awaiting the gleam of a shiner in the water below. Or perhaps you may first see him flying like a big woodpecker, screaming his chattering cry high in the air, or scaling close to the water under the fringing hemlock branches that overhang the stream. His large size, slate-blue back, loud notes, and characteristic flight make him a hard bird to mistake in any case.

THE WOODPECKERS.

BY

ANNA BOTSFORD COMSTOCK.

Mrs. Comstock has gained her knowledge of the birds from her close observation that the successful natural history artist must necessarily practice, and her work in many departments of Nature Study at Cornell University is an important feature of that institution.

IT is best to follow some definite line of bird study for an entire year. All of the observations that could be made in a single month on any bird would give but an inadequate idea of its habits. To know the life of a bird, one must study it month by month for at least one year.

The woodpeckers seem a most attractive group for our study. They are not only very interesting, but of great importance to the farmer, orchadist and forester. There are five common species in New York State that we all may learn to know, and then make observations of our own on their habits. These species are the downy, the hairy, the sapsucker, the flicker and the redhead. The way to begin our observations in winter is to tie a piece

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of suet to the branch of some tree easily observed from our windows. Such a bird feast as this is on a branch of a chestnut oak in front of my office window, and though I never have time to watch more than momentarily the birds that come there to eat, yet each glance tells me something of their ways, and my own day's work is much brighter and happier therefor. The "downy," as he is universally called, comes with his mate every day and they eat greedily of the suet; when they first arrive they are so absorbed in working this food mine that I sometimes stand directly beneath and watch them without frightening them. Perhaps they know that I am the friend who invited them to breakfast. Anyway, as soon as they leave the suet they hunt industriously over my tree, finding there all of the hidden insects, and thus they keep my oak clean and pay for their breakfast. Occasionally the hairy woodpecker comes, a self-invited guest to the suet banquet. To the untrained eye he looks very like an over-grown downy, as he is by two or three inches the longer; but his outer tail feathers are entirely white, while the downy's are barred with black; usually the red cap of the hairy is divided by a black stripe. The hairy is said to be a shy bird, but I have seen him several times this winter at a suet party near dwellings.

In April there is likely to appear in any region of New York State a bird which is often mistaken for the downy or hairy, although it is very different in both coloring and habits. This is the sapsucker, the only woodpecker of bad repute. However, I am sure its deeds are not nearly so black as they are painted. The male sapsucker has a bright red crown and chin and throat, his breast is yellow, and he is also yellowish on the back; while the males of the downy and hairy are red-capped and black and white with no yellow.

Downy, Sapsucker and Red-Head.— This morning I was awakened by the beating of a drum over in the woods. My ear was not yet sufficiently trained so that I knew whether my drummer was Mr. Downy or Mr.

Hairy, yet I strongly suspected the former. The tattoo of the Sapsucker (which does not nest here) James Whitcomb Riley has aptly characterized as "Weeding out the lonesomeness." This is exactly what the drumming of woodpeckers in the early spring means. The male selects some dried limb of hard wood and there beats out his well-known signal which advertises far and near, "Wanted, a wife." And after he wins her he keeps on drumming to cheer her, while she is busy with her family cares. The woodpecker has no voice for singing, like the robin or thrush, and realizing his deficiency, he does not insist on singing like the peacock, whether he can or no. He chooses rather to devote his voice to terse and business-like conversation, and when he is musically inclined he turns drummer. He is rather particular about his instrument, and, having found one that pleases him in tone, returns to it day after day.

In case the drumming I heard this morning was an advertisement for a wife, I am interested to know what has become of Mrs. Downy, who has been true to her mate all winter. Does, perhaps, the springtime bring divorce as well as marriage? Mr. Burroughs tells of a downy that was absolutely brutal in his treatment of his mate in winter, not allowing her to live in his neighborhood. Be this as it may, the downy and the hairy woodpeckers that have feasted upon my suet this winter have invariably come in pairs, and while only one at a time sits at meat, and the lord and master is somewhat "bossy," yet they seem to get along as well as most married pairs.

The sapsucker is a woodpecker that has strayed from the paths of virtue; he has fallen into temptation by the wayside, and instead of drilling a hole for the sake of the grub at the end of it he drills it for his own sake. He is a tippler and sap is his beverage. He is especially fond of the sap of the mountain ash, apple, thorn apple, canoe birch, red maple, red oak and white ash. He drills his holes in beautiful rows, and sometimes girdles a limb or tree, and for this he is pronounced a rascal by men who have themselves ruthlessly cut from our land mil-

lions of trees that should now be standing. However, the sapsucker does not live solely on sap and the soft cambium layer of the tree; he also feeds on insects wherever he finds them. When feeding their young, sapsuckers are true flycatchers, getting the insects while on the wing. If you find a sapsucker girdling a tree in your orchard or a birch on your lawn, just protect the trees with a wire netting, and let the sapsucker catch mosquitoes for you instead, and remember that he belongs to a good family and is entitled to some consideration, even if he has taken to drink.

The red-head is well named, for his helmet and visor show a vivid, glowing crimson that stirs the sensibilities of the color lover. He is readily distinguished from all other woodpeckers because his entire head and the bib under his chin are red. For the rest, he is a beautiful dark metallic blue and white. He is a most adept drummer, and his roll is a long one. One that I observed last spring selected a dead limb at the top of an oak tree and there he drummed merrily every morning. He is an adaptable fellow and has been known to drum on tin roofs and lightning rods, thus braving the dangers of civilization for the sake of better music. Though he can rattle so well when he is musically inclined, he is not, after all, much of a woodpecker, for he lives mostly on insects which he catches while they are crawling or on the wing, and he also likes nuts. He is especially fond of beech nuts, and, being a thrifty fellow as well as musical, in time of plenty he stores up food against time of need. He places his nuts in crevices and forks of branches, in holes in trees, and other hiding places.

*The Flicker or Yellow Hammer.** — The first time I ever saw a flicker I said, "What a wonderful meadow lark, and what is it doing on that ant hill?" But another glance revealed to me a red spot on the back of the bird's neck, and as soon as I was sure that this was not

* Home Nature-Study Course, Vol. IV, No. 32, May, 1903.

a bloody gash I knew it belonged to no meadow lark. The golden brown plumage dotted with black, the under wings of luminous yellow, the white spot above the tail, the ashen gray back, and, above all, the oriental ornaments of crescents, — one brilliant red across the back of the neck, one black across the breast, — all conduce to make the flicker one of our most showy and beautiful birds. The flicker has many names, such as golden-winged woodpecker, yellow hammer, highhole, and yarup or wake-up, and many others. It earned the name of highhole because of its way of excavating its nest high up in trees, usually between ten and twenty-five feet from the ground. It especially loves an old apple tree as a site for a nest, and most of our large, old orchards of New York State may boast of a pair of these handsome birds during the nesting season of May and June. However, the flicker is not above renting any house he finds vacant which was made by other birds last year. The flicker earned his name of "yarup" or "wake-up" from his spring song, which is a rollicking jolly "wick-a-wick-a-wick." As a business bird the flicker shines in the rather extraordinary line of eating ants. It has a tongue equipped almost exactly like the tongue of the animal called the ant eater, and it often may be seen using it with great effectiveness in catching the little communal laborers.

Those who have observed the flicker during the courting season declare him to be the most silly and vain of all the bird wooers. Mr. Baskett says, "When he wishes to charm his sweetheart he mounts a very small twig near her, and lifts his wings, spreads his tail, and begins to nod right and left as he exhibits his mustache to his charmer, and sets his jet locket first on one side of the twig and then the other. He may even go so far as to turn his head half around to show her the pretty spot on his 'back hair.' In doing all this he performs the most ludicrous antics, and has the silliest of expressions of face and voice as if in losing his heart, as some one phrases it, he had lost his head also."

THE CHICADEE.

BY

ANNA BOTSFORD COMSTOCK.

He is the hero of the woods; there are courage and good nature enough in that compact little body, which you may hide in your fist, to supply a whole groveful of May songsters. He has the Spartan virtue of an eagle, the cheerfulness of a thrush, the nimbleness of Cock Sparrow, the endurance of the seabirds condensed into his tiny frame, and there have been added a pertness and ingenuity all his own. His curosity is immense, and his audacity equal to it; I have even had one alight upon the barrel of the gun over my shoulder as I sat quietly under his tree.— ERNEST INGERSOLL.

HOWEVER careless we may be of our friends when we are in the midst of the luxurious life of summer, even the most careless among us give pleased attention to the birds that bravely endure with us the rigors of winter. And when this winged companion of winter proves to be the most fascinating little ball of feathers ever created, constantly overflowing with cheerful song, our pleased attention changes to active delight. Thus it is that in all the lands of snowy winters the chickadee is a loved comrade of the country wayfarer; that happy song, "chick-a-dee-dee-dee," finds its way to the dullest consciousness and the most callous heart.

One day in February we were, with much enjoyment, wading through a drifted highway that skirted a forest, the least twig of which bore a burden of soft snow. Over all hung that silence of winter which is the most "silent silence" that rests upon the earth anywhere outside the desert. No breeze swayed a creaking branch or shook from it the snow in soft thud to the white carpet below. Even the song of the brook was smothered beneath cover-

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lets of ice and pillows of drift. We stood fast, awed by the stillness, when suddenly it was broken by the thrilling notes of the chickadees. We could hardly credit our senses, for it seemed as if the woods were a hopeless place for any living creature that morning. But there before our eyes was a flock of these courageous birds hunting for food on the leeward sides of boles and branches left bare and black in the recent storm. Their tiny weights sent the snow in showers from the terminal twigs, which phenomenon was greeted with triumphant song while the cheerful midgets hunted the relieved branches topside and bottomside for any lurking tidbit. As we watched them, Emerson's poem came to mind:

> "Piped a tiny voice near by,
> Gay and polite, a cheerful cry —
> Chick-chickadeedee! saucy note
> Out of sound heart and merry throat,
> As if it said, 'Good-day, good Sir!
> Fine afternoon, old passenger!
> Happy to meet you in these places
> Where January brings few faces.'"

No wonder that the great American philosopher was attracted by this other American philosopher who sings when he is cold and hungry.

Besides its usual song the chickadee has a song that says "phœbe" much more distinctly than does the song of the phœbe itself. Few people recognize this, and often in February or early March it is announced in the local newspaper, "The phœbe-birds were heard to-day" though it may be weeks yet before these birds arrive. The two songs may be easily distinguished by even the ear untrained to music. In the phœbe song of the chickadee, the last syllable is at least one note lower than the first and has a falling inflection; while the last syllable of the phœbe bird's song is at least a half note higher than the first and has a rising inflection.

Not long since I visited the deserted nest of a devoted pair of chickadees. It was cuddled down in the bottom of

a hole that opened on the very top of a fence post, and, one would imagine, must have been wet more than once while inhabited. However, a large family was raised there during the past season and much enjoyment was derived from watching the many fubsy birdlings that found home and comfort in that unattractive retreat. I looked upon them with special interest, for I was sure they would visit the suet on my trees this winter and thus become friendly neighbors.

As soon as the trees are bare, nail or tie bits of suet to branches which may be observed from your windows. I know of no investment which pays such enormous dividends both to pleasure and pocket as do suet restaurants in orchards patronized by chickadees. Every child, at home or school, will be attracted by this experiment.

THE WHITE-BREASTED NUTHATCH.

BY

ANNA BOTSFORD COMSTOCK.

The busy nuthatch climbs his tree,
Around the great bole spirally,
Peeping into wrinkles gray,
Under ruffled lichens gay,
Lazily piping one sharp note
From his silver mailed throat.
— MAURICE THOMPSON.

"With more artless inquisitiveness than fear, this lively little acrobat stops his hammering or hatching at your approach, and stretching himself out from the tree until it would seem he must fall off, he peers down at you, head downward, straight into your upturned opera-glass. If there is too much snow on the upper side of a branch watch how he runs along underneath it like a fly, busily tapping the bark, or adroitly breaking the decayed bits with his bill, as he stretches for the spider's eggs, larvæ, etc., hidden there; yet somehow, between mouthfuls, managing to call out his cherry quank! quank! hank! hank!"— NELTJE BLANCHAN.

A VOICE outside is calling at me; I cannot describe it accurately, but it is making delightful woodsy remarks that make me long to throw aside the pen and go out and wander where the snow is making still softer the carpet of dead leaves on the forest floor. It is not a musical note but it is most enticing and translates into sound the picture of bare-branched trees and the feeling of enchantment that permeates the forest in winter. Neltje Blanchan says the voice reiterates "quank, quank," others say it is "nay, nay"— but no nasal sound of the human voice, and no spelling of the English language adequately represent this call of the white-breasted nuthatch.

On the tree in front of the window I can see the owner of this sylvan voice. He is a little bird blue-gray above

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with black head and black and white V-trimmings on the back of his suit, and with soft, white breast. He is flitting blithely from tree to tree ejoying the snow storm and coming often to the suet feast which I have spread for him and for his little feathered kin.

We have been having exciting times at the suet banquet this morning. The building in which my office is, stands on a high knoll near the forest-covered brink of a deep gorge. Thus my window is opposite the tops of the trees. One of our nature-study staff, a brave and gallant knight, who loves birds and knows that I love to watch them, climbed two of these trees at imminent risk of breaking his neck in order to place this suet just opposite my window. The whole chickadee family and four nuthatches, and Sir Downy and Madam Hairy had been reveling in the feast all the morning when suddenly one after another three crows appeared upon the scene. My heart sank as I saw them eying the suet with interest. Nearer and nearer they hopped from branch to branch. I pounded on the window and called out, " Go away " in both the crow and the English language, all in vain. One crow braver or hungrier than the others with one defiant eye on me flapped confidently down and sought to carry the suet off in its beak; to his surprise it was tied on. That seemed suspicious and when we raised the window and leaning far out explained matters he lifted slowly with a jeering " caw " that said plainly " I'll call sometime when you are not at home " and with that he and his companions disappeared up the gorge. The invited guests at the suet table were less disturbed than was I, and I suppose it is rather inconsistent to feed the chickadees and let the ravens go hungry. But this suet will last the little birds a month while it would hardly furnish a breakfast for three crows; and in philanthropic enterprises one is obliged to draw the line somewhere even at the cost of consistency.

I will return to my nuthatch, who, by the way, has just hammered off a piece of suet and thrust it into a crevice of the bark on the tree bole. Why does he do that: is it

for convenience in eating or is it an attempt to store up some of his dinner for future need? Anyway it is bad manners, like carrying off fruit from *table d' hote*. But he is polite enough in another respect; every time after eating the suet he wipes his beak on his branch napkin with great assiduity, first one side and then the other, almost as if he were sharpening it. The woodpeckers are similarly fastidious in cleaning suet off their beaks.

The loud note of the nuthatch, seeming to be out of proportion to the size of the bird is, by no means, its only note. Yesterday we observed a pair hunting over the branches of an elm over our heads, and they were talking to each other in sweet confidential syllables "wit, wit, wit," entirely different from the loud note that is meant for the world at large.

The nuthatches and chicadees hunt together all winter. This is no business partnership, but one of congeniality based upon similar tastes. Thus it is that the two birds are often confused. There is, however, a very noticeable character that distinguishes them at the first glance. Strange to say the nuthatch has also been confused with the sapsucker and has gained unjust obloquy thereby. How any one with eyes could confuse these two birds is a mystery, for they resemble each other in no particular nor in general appearance.

While the nuthatch finds much of its food on trees, yet Mr. Torrey tell of seeing one awkwardly turning over the fallen leaves for hidden cocoons and other things quite worth his while; and Mr. Baskett tells of having seen them catch flies in the air and becoming quite out of breath at this unusual exercise.

Audubon made some most interesting observations on the nuthatch. He says they may sleep hanging head downward. He also says of their nesting habits that "both birds work together, all the time congratulating each other in the tenderest manner. The male, ever conspicuous on such occasions, works some, and carries off the slender chips chiseled by the female. He struts around her, peeps into the hole, cherups at intervals, or

hovers about her on the wing. While she is sitting on her eggs, he seldom absents himself many moments; now with a full bill he feeds, now returns to be assured that her time is pleasantly spent."

The red-breasted nuthatch is sometimes associated with its white-breasted cousin; it is a smaller bird and is essentially a northern species. The nuthatches get their name from their habit of wedging nuts and acorns into bark and then hatching them open. From every standpoint the nuthatches are most desirable acquaintances, and we cannot spend our time to better advantage than in getting familiar with their interesting habits.

ABOUT CROWS.

BY

MARY ROGERS MILLER.

Mrs. Mary Rogers Miller is one of the lecturers on Nature Study at Cornell University. She has contributed to the leading magazines and educational publications and is the author of "The Brook Book."

THOUSANDS and thousands of crows fast asleep amongst the branches of a grove of pines! The trees themselves look dark and sombre against the snowy hillside, but when the assemblage of dusky birds has gathered there, the shadows thicken and the darkness settles like a pall. Soon all is hushed and silent.

Would you not go miles to see such a sight? Yet maybe you have lived for years within easy walking distance of a great crow "dormitory" without even suspecting its existence. You may have watched the crows flying overhead every morning and then again every

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afternoon, without noticing that they came from the same direction each morning and returned at nightfall. This was just my experience until I began to care about crows and their ways. Now I know that there is a sleeping roost a mile or so up one of our wooded valleys and the oldest inhabitant tells me that he remembers seeing "more'n a million" crows up there in winters when he was a boy. Undoubtedly generation after generation of crows return to these sleeping places; certain localities have probably been so used for centuries.

Although we have crows here all winter they may not be the same individuals that spent the summer here. The center of crow population in the Eastern United States from November till February is the neighborhood of Chesapeake Bay. There the food supply is more abundant than where the ground is snow-covered in winter, and thither the crows migrate in innumerable armies. Dormitories from ten to thirty acres in extent and accommodating from ten thousand to three hundred thousand crows each have been found in that region.

Why crows gather thus in companies either small or large is undoubtedly due to their natural sociability. The opportunities for exhibition of conversational powers offered by such a custom seems to be greatly appreciated by every crow. Such a babel as they raise when in early morning their watchman rouses them from sleep! They appear to be reviling him for his untimely interruption. For several minutes the woods fairly ring with their loud, coarse shouts. Then, as if resigned to their fate, they take flight towards the feeding grounds. By sunset they all congregate again and after recounting their adventures, settle down early to sleep.

In open winters crows fare well enough. Seeds and berries are easy to get and considerable grain may be found in harvested fields. But like barnyard fowls, crows are omnivorous. After the grasshoppers disappear, a supply of animal food is hard to get. The silken egg-sacs of spiders are often found torn open and rifled, while suspiciously near by are the tracks of crows. Un-

doubtedly rabbits and field mice would unite with the spiders in declaring the crow to be their deadly enemy.

That crows eat corn is undeniable. The farmers know it to their sorrow, the bird's champions reluctantly admit it, the crow himself goes openly into the field, both in winter and summer, with no intent to conceal his intentions. And yet this universally acknowledged habit will bear investigation. Upon the real or supposed injury done to sprouting corn and to roasting-ears, the farmer and his sons base their animosity toward crows and rejoice at the wholesale or retail slaughter of these birds. Carefully prepared estimates show conclusively that the crow is the farmer's friend. Only *three per cent* of the total food of the crow consists of corn in any form, while *twenty-six per cent* consists of insects such as grasshoppers, May beetles (June bugs, whose young are the white grubs), cutworms and other injurious kinds. On such evidence as this would not an unprejudiced jury acquit the crow?

The best way to establish the crow in this new and true relationship to the farmer, is to interest the boys and girls in studying crows and their ways. To make a fair judgment, one must collect evidence. Mere hearsay is not always to be depended on. Justic and truth are worth working for. The case of the Crow *vs.* the Farmer, will give opportunity for the practice of both of these virtues.

CURIOUS BIRDS OF SOUTH AMERICA.

BY

ARTHUR H. BEAVAN.

A SHORT railway-journey took us to Lima, the capital, which I am not going to describe, beyond mentioning that the houses have flat roofs and that a stream of water flows along the centre of all but the main thoroughfares.

There the first thing a lover of natural history notices is the strangely tame large birds sitting on these flat roofs in the most ridiculous attitudes, particularly if the weather be extra warm, when they extend their wings as though desirous of cooling themselves by letting in as much air as possible upon their bodies.

These domesticated wild-fowl are called in Spanish, *Gallinázas;* in Indian, *Urubus;* and in English, *Carrion Vultures,* or *Turkey-buzzards.* They are about the size of the noble Thanksgiving bird, and, like it, their plumage is black and their necks bare and fleshy-red. But here the resemblance ceases, for the gallináza is not the kind of poultry to welcome on the festive-board with an accompaniment of chine or sausages! As a matter of fact, he is a scavenger, living on decomposed animal matter and refuse of all kinds. He is therefore most useful, and, as in the case of the Indian adjutant crane, a heavy fine is inflicted on any one who kills him. Thus, having acquired the rights of citizenship, and knowing himself protected by the arm of the law, he has become perfectly tame and confident.

Exploring the back streets of Lima early one morning, I saw these feathered scavengers at work. They were apparently indifferent to everything but the business upon which they were employed, until *a window opened!*

From "Birds I Have Known." By Arthur H. Beavan, New York. F. A. Stokes Company.

At the sound the gallinázas were instantly on the alert. A woman appeared, and, without the warning cry of "gardeloo" (as used in old Edinburgh), emptied into the street the accumulated house refuse of the previous twenty-four hours, including two or three dead rats, a defunct cat, and a fowl in a "high" condition. This was some years ago. Lima is now sanitated in up-to-date style, I believe.

The gallinázas were now transformed into incarnations of liveliness. They swallowed the refuse and attacked the carcases, poor pussy being seized upon by a bird at each end, and was completely torn asunder. The rats were swallowed whole; while the fowl, being soft and tender from decomposition, was easily separated into half a dozen tid-bits. In ten minutes' time not a particle of insanitary matter remained in the road. The same process of "refuse-throwing" went on at intervals from most of the houses, until the birds were gorged and had to retire.

The Chinchas, 150 miles S.S.E. of Callao, was the destination of the barque, there to load with guano for Liverpool. But Spanish "red-tape" ordained that the ship should sail past her destination on her way up from the south, to Callao, and thence beat back against the light trade-wind to the islands, and take in her cargo; the same formality of touching at Callao being required on the voyage home, a frightful waste of time and money.

At last we got away from Callao, and after three days of weary tacking, dropped anchor in very deep water off the principal, or Northern, island.

For centuries these islets, three in number, lying ten miles from the town of Pisco, on the mainland, in latitude 14.20 S., have been the resort of innumerable seals and sea-birds, the former crawling there to die. Their bodies, with those of sea-fowl, their eggs and excrement accumulating for centuries in this rainless climate, had gradu-

[1] *Gare de l'eau,* look out for the water; one of the many curious survivals of the French in the Scottish speech.

ally covered the bare rock and formed a mass averaging thirty feet deep, and rising into a peak eighty feet thick at the summit.

This is guano, the famous fertiliser brought to the notice of European farmers in 1841, but used by the Peruvians ages ago, long before the Spaniards came into South America.

The Republic of Peru derived a large revenue from its sale (I use the past tense, because practically all the guano has been cleared off), and, being naturally desirous of encouraging the birds to remain in the vicinity of the islands and thus help to replenish it, they imposed a big fine upon any person killing them or, in fact, any other creature (except man!). In effect, the shooting of a bird or a seal on or near the Chinchas, was strictly prohibited, and if a gun was even innocently discharged on board a vessel at anchor, as likely as not a smart boat would put off, and, ascertaining who the culprit was, would arrest and fine him.

But neither the guard-house nor the guard-boat could be everywhere, and two of the islands — the Middle and the South — were almost deserted being not yet worked, and became my happy hunting-grounds regardless of regulations.

Within a few yards from the guard-house stood a rock, approachable only by water, and appropriated by a solitary pelican as a convenient resting-place. It was a splendid bird with black wings, bright-coloured hackle — blue, red, and yellow—and a fine tuft of upright feathers on its head. It was the biggest specimen I had ever seen, and inquiry elicited the fact that it had haunted the spot for years. So it was probably the oldest pelican on the islands.

For hours I used to watch the pelicans fishing round the islands, diving headlong from a great height with a splash whenever their sharp eyes detected a shoal of fish, and emerging from the water with their capacious pouches full of silvery mullet. Fish were everywhere,

and no doubt this had always been the great attraction for seals and birds.

On the South Island were numerous small petrels, somewhat like skua gulls, living in burrows running deep in the dry guano. But when I put my arm into these burrows as far as it would go, to try to pull them out of their stronghold, they fought desperately, and their bite and scratch was no joke.

Beautiful terns — graceful performers on the wing — with red beaks, flicked about in every direction. Of land birds there were none; at any rate, I did not come across any, and I doubt if, in the absence of vegetation, they could have existed.

How I escaped drowning, or being shipwrecked on the rocks, I don't know! A friendly doctor, resident on the North Island, lent me his boat, seaworthy, but so small that there was room in her only for myself, and, perhaps, a big dog, or small boy. She was fitted with a leg-of-mutton sail, like the famous craft in which Robinson Crusoe escaped from Sallee, Morocco, with the faithful Xury.

In this cockle-shell I used to take lonely voyages, exploring the inlets, channels, and out-lying rocks of the Chincha group, fishing, and ever ready with gun for sea-fowl, and with rifle for the seals and sea-lions which swarmed.

It seems odd to think of penguins in the tropics. We generally associate them with antarctic regions, lonely, storm-swept islands, or on the mysterious, snow-covered continent around the South Pole, partly explored by Sir George Newnes's good ship, *Southern Cross,* where the voyagers found king and emperor penguins, bulky travesties of birds, and wingless, the latter five feet high.

But all up the west coast of South America, probably because of the abundant fish life, small penguins (not unlike those of the Cape and South Africa) swarm, and may be seen standing on the rocks close to the water, into which they can dive in a second. They are neither

shy nor suspicious on land, and are easily approached. Once in the water they are almost impossible to shoot, being quick as grebes, and diving at the flash of the gun.

Like their big relations far south, the west-coast penguins have curious feathery head-ornaments, reminding one of Red Indians. They rejoice in white breasts, which they keep scrupulously clean; their backs are black, and when seen from a distance standing bold upright, they look exactly like little boys in white waistcoats. At sea (where they are often found far from land) they utter a strange, wailing cry, and many a mate, keeping watch in the small hours off the Falkland Islands, has mistaken it for the distressed cry of some poor fellow-mariner fallen overboard from a distant ship.

River Plate Birds.— The River Plate, or Argentina, as it is usually called, is veritably a land of pastures; a land covered with sheep and oxen sufficient to feed Britain year after year with ease.

Wherever the branches of the mighty Parana, and Uruguay, that form the Rio de la Plata, are large (which most of them are), a fringe of wood belts their courses, emerging wherefrom are rising hillocks, covered to the summit with pasturage clear of shrubs, the district being like the South Downs, but with black loamy soil, immensely fertile.

Beyond, the country is generally flat and open, or presents a monotonous succession of gentle undulations with here and there an isolated tree. In the spring, the grass is a vivid green, gemmed with wild flowers, such as scarlet verbena, red, yellow, and blue clover, and white campanula. The cattle spread out in groups as far as the eye can reach; while innumerable flocks of sheep are dotted over the ground; and one realises that this is indeed a country of flocks and herds.

The first thing I noticed was the extraordinary tameness of most of the birds except in spots where they had been much shot at by Englishmen, the natives rarely using a gun.

The isolated trees were full of small finches, miniature doves, linnets, and cardinal-birds; the last-named looking most knowing with their red top-knots. They are of a playful disposition, and love a bit of fun, and they dodged me round and round a tree looking most impudent all the time. When I approached quite close, they slipped through the branches, and I believe would have repeated this process indefinitely rather than take the trouble to fly off to another tree; though the neighbouring presence of hawks and eagles, ready to pounce upon them if they broke cover, might partly account for their conduct.

These raptorials are as fearless as the kites in India or the eagles in Tartary, where it is related that some travelers were once seated round a pot in which venison had been stewed, and were just about to partake of it, when they heard a noise overhead like the rushing of a storm, and a great bird dashed down, rising with a piece of meat in its claws, and simultaneously giving the cook a sound box on the ears with its outstretched wings.

I had no such experience in the River Plate, for there eagles get more than they want to eat, in the shape of young lambs and stray calves and foals. I narrowly escaped, however, being much hurt. I was out with a rifle, hoping for a shot at an ostrich or a deer, when a big eagle came and hovered around me. I fired, and brought it down with a broken wing. Having had little experience with eagles, I thought it was in a helpless condition, but, to make sure, I hit it, as it lay on its back, a heavy, and, I hoped, a mortal blow with the butt end of the rifle. In an instant it seized the weapon with its powerful talons, tore it from my hands wrenched the lock from the stock, and bent the hammer!

Looking at the creature's magnificent form, a model of compacted strength, I recalled Tennyson's lines —

> "He clasps the crag with hooked hands,
> Close to the sun in lonely lands
> Ring'd with the azure world he stands,

The wrinkled sea beneath him crawls;
He watches from his mountain walls,
And like a thunder-bolt he falls."

As a matter of course my ambition was to become the possessor of an American ostrich shot by myself. There was a flock of about twenty in the *estáncia* (sheep and cattle-farm) where I was staying; and, borrowing a horse, I set out for a ten-mile ride to the district frequented by them. They are not shy of men on horseback, being accustomed to them, but an individual on foot is an alarming object, while dogs are their pet aversion, and they will scour away at the sight of a puppy.

They are called rheas, and — as can be seen in the Zoo — resemble small ostriches, but have three, instead of two, toes. Like cattle, they browse on grass; they are of gentle disposition, and become so domesticated that they may often be seen in small and remote towns marching into the houses, making the tour of the rooms — generally all on the ground floor — and going back to their roosting-places at eventide.

However, to return to my hunt. Presently I came in sight of the flock, and had no difficulty in getting within reasonable distance. But firing a rifle from *terra-firma* is very different from doing so on horseback. It was useless, for as my steed cantered round them the barrel wobbled up and down, until in desperation I let fly anyhow, and, of course, missed.

The report startled the rheas, and they set off at a dignified, and what appeared to be, a moderate, run, which I thought would be easy to surpass. Not a bit of it. They let me get within a couple of hundred yards, and my horse, who was keen on the chase, did his best to close with them; but, without any apparent effort, the rheas glided ever so far away, paused, and looked back as much as to say, "What is the use of your attempting it!"

This performance was repeated, until both I and my horse were tired. So I dismounted, let the *broncho* go

(he needed no hobbling), and proceeded to stalk the flock. But it was no good. They had become suspicious, and made for the top of one of the hillocks whence they could see ever so far; so I never got nearer than five hundred yards of them, and though I blazed away with my old-fashioned rifle, all the ostriches lived to tell the tale.

As a rule, ostriches are ridden down by the *gauchos*, who circle round the flocks and secure them with the bolas, or the lasso; or they are chased straight on end by dogs and relays of horsemen.

CURIOUS BIRDS OF AUSTRALASIA.

BY

ARTHUR H. BEAVAN.

AUSTRALASIAN land birds, although they comprise between six and seven hundred different species — each of which is abundantly represented — and are of remarkable brilliance and beauty, are often dubbed uninteresting for it is only with considerable trouble that one can follow their movements; and this the average observer does not care to bestow.

So marvelously does their colouring (even that of the parrots and cockatoos) match the grey-green foliage of the gum-trees, that even while one can hear them overhead, it is by no means easy to catch them with one's eye.

Some of the most interesting birds are purely nocturnal, and in the daylight even the large emu manages so effectually to hide itself that one seldom detects it in the bush or on the open plain until one is almost on the top of it, when off it goes at a pace that a well-mounted horseman finds it difficult to beat. They possess three toes (ostriches have but two). I think we associate Australia chiefly with kangaroos and emus. The latter

From "Birds I Have Known." By Arthur H. Beavan, New York. F. A. Stokes Company.

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1.—Ceram Cassowary. Like the Ostrich, this is one of the most voracious of birds, and will swallow whatever comes in its way.

2.—Razor Bill Auk. The Auk is a fast disappearing bird, and this is the last of his family.

3.—Australian Black Swan, once considered to be the rarest bird on earth, is now a familiar object in every Zoological Collection

are easily domesticated, but are very powerful, and at certain seasons they are dangerous.

Strolling one day in a small paddock, where half a dozen were accustomed to be fed from my hand, and were usually most peaceable, to my surprise they all came running towards me in a threatening manner, looking very angry. I had forgotten — having been absent a little while — that it was their mating-time, and I suppose they mistook me for an intruder of their own species!

I slowly retreated backwards, but this did not pacify them, and they all simultaneously "went for me" with beaks and legs. The situation began to be serious, as there was no one near to help drive them off. Having a stout umbrella I contrived to open it suddenly, full in their faces, which considerably startled them and gave me a little time to get nearer the fence. But it was no good; they became still more furious, pounced upon my umbrella, and kicked it into shreds. In the meantime, however, I made my escape, with my light coat torn to pieces, and some rather nasty knocks and bruises on arms and shoulders.

Next in size to the emu is the cassowary, a stupid, quarrelsome bird, which, like an emu, cannot fly. Its feathers resemble bristles, and its fleshy neck appendages are of vivid colours. Nobody seems to care for cassowarries. They look old enough and uncanny enough to have been denizens of the Ark. I have noticed that in the London Zoo people stop to look, in a pitying kind of way, at the aged and melancholy specimen there, with its broken helmet, as if it were some kind of outlandish antediluvian.

Luckily for the cassowary, its flesh is uneatable except by the aborigines, who, no doubt, sometimes make a meal of it, as they would of anything. So massive and strong is it, and so violent in the breeding season, that it is not a pleasant acquisition in an aviary. Emus and cassowaries think nothing of swallowing the strangest of articles, such as pieces of iron and glass, fragments of brick and leather, and other indigestible trifles. It is re-

corded that once an emu died from swallowing a packet of tobacco.

Turkeys, wild or native, and excellent to eat, are merely bustards.

Australia is a land of handsome eagles and eagle-hawks. Shepherds detest them, because of the inroads they make upon their lambs, whose delicate flesh these raptorials too much appreciate. They are, for their sins, condemned to be poisoned with arsenic — rather a pity from a sentimental point of view. I have often come across their nests, usually on the summit of lofty dead trees. They are immense, composed of as many twigs and branches as would fill a wagon.

The coasts, rivers, and lakes swarm with wild-fowl, including the graceful black swan, whose beak appears to have been dipped in red sealing-wax.

Then there is a most amusing and sociable bird, called the native-companion — a great crane, four feet high, and very useful in waging deadly war against insects. Like the rest of its family, it indulges in the most ridiculous dancing movements with its long legs and in eccentric twistings of its bill. It has, also, a nasty habit of darting its beak — a sharp and unerring weapon — at anything shiny, and thus bright-eyed children peering at them through the bars of aviaries have sometimes been deprived of their sight.

Cockatoos in their native fastnesses are interesting. But to get a chance of studying them you must set out very early in the morning, for they are intensely wary, and while taking their fill in a field of corn — of which they destroy much more than they eat — they place a sentinel on guard. If you can approach a flock without being seen, you will be amused by their playfulness and funny, discordant chatter. One would think that every topic of the antipodean day — the price of wool, the latest test match, the chances of much-needed rain, &c. — was under discussion, especially that of the continued and abhorred encroachment of man upon their domain, though as a matter of fact this would give them, as a

satisfactory "set-off," a greater number of orchards and fields of grain.

There are several kinds of cockatoos. The great black, red-crested cockatoos, rarely seen in captivity; the sulphur-crested, the rose-coloured cockatoo, &c.— all alike in being noisy and tiresome, and in having beady black eyes devoid of any expression save that of astonishment.

That beautiful creature, the bower, or satin-bird, is seldom seen. Its plumage is like glossy black satin. Hence its alternative name. In the light its feathers have a play of colour similar to that of the raven. This extraordinary bird builds itself a kind of tunnel-nest and play-ground combined, and decorates it — it is composed of twigs — with feathers and any glittering thing it can get hold of.

The lyre-bird is well known, for most travelers take home a set of the sixteen peculiar-formed tail-feathers, so like an ancient harp.

Many of the birds met with in the solitude and monotony of the interminable bush are of dull appearance; but cockatoos, parrots, piping-crows, and laughing-jackasses, are notable exceptions. These last-named — giant kingfishers of a lightish-brown, with blotches of pale blue on their wings — do not resort to water, and a fish diet is unknown to them. They live on snakes and other undesirable reptiles. At early morn, with the faintest glimmer of daylight, the stillness is broken by their extraordinary laughter, a kind of gurgling crescendo note, which greeting to the rising sun is given with such regularity that they have been called "the settler's clock."

These jackasses, with head-feathers erect, suggesting a woeful disregard of the amenities of brush and comb, sit, benevolent-looking and motionless, on some prominent branch, where with their short tails cocked up, they can be seen by all, for they are fearless of man. There they sit, solemn as an assemblage of pawky Scotch elders, until, without any apparent reason, when one least expects it, they give vent to their most comical guffaw.

I don't think the laughing-jackass in the London Zoo

has ever indulged in a genuine laugh. Probably the keeper who has charge of him could tell us; but the jackass, no doubt, finds it no laughing matter to live in a country, where for nine months in a year, there is hardly a sun, worth calling a sun, to greet.

Moreporks (or mopokes), the Australian nightjars, who sleep all day and hunt all night, before retiring to rest help at the *matinées* I have referred to, reiterating their cry of "More pork" (though the boobook owl is said to enunciate these words still more clearly).

No wonder the aborigines believe in ghosts, for as they sit by their fires after dark the bush is filled with mysterious sounds. High aloft, first in one place, then another, a species of curlew sobs in the most weird manner, while owls contribute their blood-curdling hoots, night animals grunt and squeak in startling fashion, and from the water-holes bull-frogs keep up an incessant accompaniment of deep croaking.

The morning concerts, begun by the laughing-jackasses, is joined in by the leading tenors, the magpies or piping-crows, with their flute-like notes. They, like the jackasses, are strictly protected by law in Australia.

Mrs. Magpie builds fearlessly, close to the houses; but if any one goes too near her little home, down swoops Mr. Magpie in a great state of excitement, and so bold is he that I have seen him rush at a lady innocently riding by, and furiously peck at her hat.

Australian magpies are born mimics, and can be taught to pipe simple tunes very correctly, but they invariably fail to learn the last note, for which they substitute their own enchanting whistle.

I had one of these birds, the most comical of its kind, and up to every trick. It would run away from me, and when I caught it up would throw itself on its back and pretend to be dead when I tickled it. Jack could sing—

> "Merrily danced the Quaker's wife,
> And merrily danced the Quaker,"

spendidly, all but the final note. He was a good-tempered

bird, and a universal favourite, and would never use his formidable, sharp beak, even under the dire provocation of being carried in people's arms like a kitten. No! after such an insult he would simply retire to some inaccessible place, and there spend an hour in straightening his sadly ruffled feathers.

Poor Jack! I had to take leave of him, and so fond of me had he become that I am sure, if he could, he would have shed tears when we said our last farewell. . . .

A bird that is a great nuisance to sportsmen in the bush, is the spur-winged plover, called the alarm-bird, always alert, and, on the slightest pretext, uttering its piercing cry, which, like that of the English jay, warns all the game round about.

Delightful beauties are parrakeets. Imagine a cloudless day, with the thermometer anything you like over 85 degrees, and, as you ride through the bush, perspiring at every pore, and envying the folk at home under their leaden-grey sky, you suddenly hear a scream from the gum-trees, whose heads tower one hundred feet above you, and a mass of vivid colour darts by like a flash of lightning! It is a flock of parrots and parrakeets. Presently, from the ground rise "bujerigars," known to us as "love-birds," pretty little things with tails as long as those of the pheasant, whom they are sometimes called after, their flesh having a gamey taste.

There are also green leeks (small parrots good to eat), rosellas, and lories — all of the gayest plumage — haunting the gum-trees.

The white gum and the wattle (mimosa) in their full blossom, which bear a substratum of honey, are great favourites with parrots, every branch swarming with them.

Standing on one's head to read is nothing to the feats performed by these born gymnasts, who can feed upside down, holding on to a branch with one claw, and are at ease in every conceivable attitude.

Pigeons are very numerous in Australaisa, nearly one-half of the known species being found exclusively in that

great continent and in the islands to the north of it. They range in size from the giant crowned-pigeon of New Guinea to the little turtle-dove, and include the well-known wonga-wonga and the terrestrial bronze-wing (the bronze only showing in certain lights), all of them excellent eating. The bronze-wing can travel sixty miles an hour.

Besides the birds I have mentioned, there are many lovely little creatures, some called after the English birds they are supposed to resemble. Robins there are, interesting and lively, with the orthodox red breasts, but with feeble voices. There are magpie-larks marked with black and white, whose cup-shaped nests of mud are beautifully built; fire-tails peculiar to Tasmania; native sparrows with red markings on their heads; the emu-wren, the queerest and most graceful mite, the tail decorated with five feathers absurdly long for its size; and fig-eaters, small, delicately shaped birds, who delight in ripe figs, the insides of which they completely hollow out, leaving only the rind, but so intact does the fig still look that it is only after the human fig-lover has gone to much trouble to get it from the top of the tree (which grows to a great size in Australia) that he finds, to his disgust, it is nothing but a hollow case.

Minahs — a kind of starling with a curious white frill at the back of their heads, giving them the appearance of having been badly shaved — have been introduced from India, and are to be seen in every town where there is grass, hunting for insects. Like starlings, they are noisy, lively, and amusing.

Sparrows, alas! have, like other British birds, been acclimated, and curses loud and deep are bestowed upon the memory of the enthusiastic gentleman (I knew him well) who introduced these nuisances, the indictment against them being that they prefer cereals and the buds of fruit-trees to the insects they were brought over to destroy.

New Zealand has acclimated many English birds, as it possesses few of its own, those few, however, being

peculiar and wonderful. There is a handsome darkish parrot, with long and formidable beak which, though not less innocent-looking than most parrots, is an atrocious murderer. By some chance he, or one of his ancestors, discovered, when hopping about, perhaps, at some slaughter-house, that mutton fat and sheep's kidneys are good eating. Ever since, whenever he has the chance, he pounces upon a stray sheep, tears open its back, extracts the tid-bit and leaves the poor creature to die in agony. So the keah, or "kaka," as he is called (his name should be "wolf") finds every man's hand against him. New Zealand is, ornithologically, a land of mystery. It owns the apteryx, a seeming "freak," with legs utterly disproportionate to its small body. It looks like a bloated woodcock or wingless curlew, and lays eggs as large as a swan's. Being strictly nocturnal, it is seldom seen, but if by chance run to earth in the day-time, its temper is roused, and it spits and scratches like a cat.

One other bird (though I have never known it in the flesh) I must mention before I have done with antipodean feathered life. I refer to the Moa, extinct (if indeed it be extinct) so recently that its bones have been discovered full of gelatine. Imagine yourself an ardent ornithologist, alone in the grand forests, surrounded by mountains covered with tree-ferns and giant pines, suddenly confronted by a wingless bird, twelve feet high, looking like a three-toed ostrich with a large spur, and with legs thicker than those of a horse, who solemnly, in its own language, asks of you, "Where is that egg you have stolen from me?" the said egg being about 1 foot 3 inches long, with a capacity of over a gallon —*i.e.*, sixty-four times greater than that of a hen's egg. Yet this egg is small compared with that of its defunct relative, the epiornis of Madagascar, which held double the quantity.

An average fowl's egg, it may be observed, is 1 inch by 1⅛ inch, and holds not quite half a gill!

THE BIRD IN THE AIR.

BY

FANNIE HARDY ECKSTORM.

Mrs. Eckstorm has written much on birds, the Maine Woods, the Game Laws and some stories under the name of F. Pearson Hardy. She is the author of "The Woodpeckers" and "The Penobscot Man."

IN order to understand how the bird's wing can resist the pressure of the air, we must examine the wing-quill of some large bird. Our Christmas or Thanksgiving turkey may furnish us with a stout wing-feather, or we may pick some up in the parks in summer when the ducks and geese are moulting, or we may, if nothing better can be obtained, pull a feather from the turkey-tail duster, remembering always that we have a tail-feather, not a wing feather. But having procured a broad-webbed feather, study it carefully. Rub your finger along the webs to test its elasticity. Notice the effect of pressing it in different directions and observe how it stretches under pressure like a piece of jersey cloth, breaking apart only under rough usage or great strain, and readily being coaxed back into place again.

What makes the web of the feather so elastic? The question is not easy to answer clearly, for a feather is complicated and its parts are minute. With the unaided eye we see too little and with the microscope we see too much. We shall understand best by taking for the first a feather whose parts can be readily made out without a microscope. An ostrich plume, for example, is made up of a multitude of little plumes, called *barbs,* attached to a quill, or *shaft;* and each of these barbs is itself a miniature plume with its own shaft and barbs, to which is given

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the name of *barbules*. Few feathers show the barbules as plainly as these plumes of the ostrich, but the ostrich's barbules are not connected, so the plumes would be wholly useless for flight even if the wings were large enough to lift the bird.

In the long feathers of the peacock's tail-coverts we see a feather that is fringed with scattered disconnected barbs near the base, but is tipped with interlocking barbs. We notice too that the barbs are set upon the shaft at an angle, so that where they come close together they overlap like clapboards on a house; and the barbules, being hooked at the end, catch hold of the barb next in front of them, and hold to it. Thus at the tip of the peacock's feather there is the beginning of a true web. The barbules, we notice, are all upon the upper side of the barb, or upon the upper *edge* of the barb-shaft, if we observe more closely; for the barb-shafts have been greatly flattened, and they lie side by side like the thin leaves we see beneath a toadstool on turning it over. This is an arrangement to give stiffness without increasing the weight, and it greatly strengthens the feather to bear the upward pressure of the air.

In the hawk and eagle this arrangement is even more remarkable, though we cannot see it so easily. And in these strong-flying birds the barbules interlock much more firmly, so that the feather is impervious to air, and is stiff enough to resist the pressure of the wind.

Without a microscope we cannot see the little barbicels, split up like shaveings partly cut from a stick, and like them hooked at the ends, which reach out from the barbule to barbule binding the feathers together still more closely. Some of the other arrangements are too minute to be seen by the naked eye and not easily understood from description, but in every part we find the feather wonderfully planned to resist pressure of the air without the slightest unnecessary weight.

These little barbules have to hold tight to each other; for if they lost their grip the wind would blow up through the gap, and much of the effectiveness of the feather

would be lost. If a bird is to fly well it must have firmly webbed feathers, and all flying birds have them. If the ostrich had wings as large as thunderclouds, he could not fly unless his airy plumes were replaced by good quills fit to beat down the air under them.

We observe that all the long quills overlap each other like the shingles of a roof, and that the unevenly webbed primaries lie with their narrow edge uppermost, and their wide web caught under the quill next nearer to the body. This greatly aids in making the wing air-tight; for, on the downward stroke, the wide web is pressed so firmly against the strong quill and stiff outer web of the next feather that the air cannot pass through.

But on the up stroke there is nothing to hold the weak web, which is borne down by the air, and thus the pressure on the wing is relieved. While this would happen anyway, it is such a help to the bird in flying that a special apparatus is provided along the back of the forearm for turning the secondaries on edge to let the air pass through on the upward stroke. By these arrangements the bird is able to press down a large quantity of air with every wing-beat, but is not required to lift an almost equally large amount when the wing rises. The inability to do this is what makes the bat so much less swift and capable upon the wing, although in comparison with the weight of his body his wing area is very much greater than the bird's.

As long ago as King Solomon, who was the first naturalist, "the way of the bird in the air" was one of the stock mysteries for men to wonder over. How *does* a bird fly? It is only recently that the secret has been discovered.

In order to fly a bird must have wings large enough to support his weight, and muscles strong enough to move his wings; there seems to be nothing else required beyond a proper adjustment of power and supporting surface. We do not at first observe any such wonderful adaptations in the wings as we saw in the loon's foot to fit it for a life in the water — merely more or less wing,

longer or shorter, pointed or rounded. But the wonderful thing is that the bird can fly at all.

Here we have the problem in its simplest form; how is an eagle, weighing ten pounds, to raise himself in the air by flapping two broad fans that spread from tip to tip some seven feet? Some say that his hollow bones and the air-sacs in his body help to lift him,— as if a bird were a balloon. But a balloon, if filled with *air,* would rise no more than a grocery bag blown full and tied; a balloon is always filled with gas *lighter* than air. An eagle can never, by any kind of puffing himself up with air, diminish that ten pounds in weight, even by a single ounce. The balloon theory finds two other obstacles — a balloon must sail before the wind, and it can travel no faster than the breeze that bears it, while the bird's speed is voluntary, and he usually prefers to fly against the wind. The bird's power to fill himself with air does not account for his flying.

Others say that the bird flies like a kite, and this is partly right. The bird's body does act very much like the string of a kite, serving as a weight to hold it steady. But the kite cannot lift the boy at the end of the string; if it could, the kite would fall just as we see it do when the string breaks.

That laughable story for boys, "Phaeton Rogers," tells us how Phaeton made his great kite draw his wagon down the road, and how the kite ran away with him while the whole town raced after to find out what the matter was. Now we know that the kite would not fly at all unless it could keep a taut string; and the faster the wagon moved the nearer it would be to outrunning the kite, so that it is hardly probable that Phaeton's wagon would travel as fast as the story says. Did you never underrun your kite and bring it down even when there was a good breeze? Now in most instances a bird outruns the breeze, and he has no stationary weight; for his body, the weight, travels as fast as the wings. So we see that a bird does not resemble the kite.

More nearly does the bird resemble the swimmer, who

supports himself in the water by striking out with his arms, pushing himself up and forward by the resistance of the water to his stroke. The bird rises and moves ahead by the forward and downward sweep of his wings, falls a little in air as he again raises them, and once more moves ahead and up with the new stroke.

Like the swimmer he advances by a series of undulations, a long incline upward when his wings press the air, a little drop downward as he raises them to get them in position once more. But the bird's stroke is different from the swimmer's. As soon as his wings are at their highest point, they begin to turn *forward* and downward with a strong, even sweep that lifts the body and carries it ahead.

The air is driven backward less by the direction in which the wing is moved than by the curvature of the under surface, by its general shape, and by the rotary motion at the shoulder joint. When it is necessary to recover for the next stroke, it is wonderfully neatly done. The wing bends at the joint, leaving only half as great a resisting surface, the secondaries roll on edge, relieving still more pressure; the body drops a little by its own weight, and up flies the wing into place so quickly that the camera can get but two pictures, though it takes four of the descending stroke. Please notice carefully that the wing-beat is a *forward* motion; the tip of the wing never drags far back; even when it is ready to be raised it is still on a line with the eye. The bird is always reaching ahead to cut into air not yet disturbed by his own movement.

We know that the bird rises by the resistance of the air, using his wings as levers and the air as a fulcrum. But how does he get his start? How does he guide his course? How does he stop?

Watch different birds taking flight. The old crow on the fence-rail, if there is no breeze, throws himself forward and drops a little, which gives him his first wing stroke with all the momentum of his falling body. When there is a wind he turns to face it, even if he intends to

fly in the other direction, stretches up on his legs to his full height, and lifts his wings. The wind fills them. He leans down upon it, and his first stroke gives him headway and bears him up.

Many birds give a little leap in the air as a help in rising from the ground. From a tree it is easy for any bird to get upon the wing, but starting from a level surface the difficulties are greater and they increase with the weight of the bird, whether he be a good flyer or not. The turkey-buzzard, a majestic bird on the wing, makes a slow, ungraceful start. The eagle, even when in danger of his life, has been reported to stop to run in awkward leaps several rods because he could not at once gain momentum enough for his wings to get their leverage. The loon is habitually in a worse plight, for he can get no chance to spring from the water, and must get his momentum by running along the surface, flapping his wings. Even then his wings are too small to lift his heavy body unless there is a breeze blowing.

What is momentum? — *an impulse to go ahead.* A body at rest has only a tendency to stay still, its *inertia,* until something sets it moving. The bird starting to fly must overcome its inertia. If it can once get the going-ahead motion, all it needs to do is to hold its body in the right position and lift itself with its wings.

Holding the body in this or that position alters the direction of the bird's flight. If he wishes to rise he throws the body into a more or less vertical position, according to the angle at which he wants to ascend; if he wishes to glide down, he just lets himself fall forward. The straighter the body is held the straighter up the bird goes. The straighter it is held the more directly he descends.

If you should ever see a game bird "tower" you will notice how erect the body is. I know no flight among our American birds so nearly vertical as the towering of the ruffed grouse, but it is an exhibition not often seen unless one is with a gunner, as the birds seldom or never tower unless wounded in the head.

We have already described the forward movement of the bird in studying the stroke. Let us notice again the peculiar folding of the upraised wing and the rolling secondaries which spill the air and make the work of lifting the wing both quick and easy.

Speed in flight is attained in two ways — by the shape of the wings, and by the quickness with which they are moved. A small-winged bird may fly very fast by moving its wings with great rapidity, and a large-winged bird may be a slow flyer if it move its wings very slowly. But if two birds move their wings the same number of times a minute, that one will fly the faster which has the longer wings, because it has the greatest leverage on the air. We shall notice too that all swift-flying birds have very strong primaries, and the stronger flyers have also very long primaries. Long wings, long primaries, strong primaries, make the work easier for the bird.

Very swift birds one may expect to find with narrow wings. The reason is that the wings are levers and their length and strength give them their efficiency without regard to their width. So the swifts and swallows and terns have very long, narrow wings. Birds with wings both wide and long must either be rather slow flyers or else in the habit of soaring, for which they need a large area of wing. But a very long-winged bird, even though its wings are narrow, may be able to soar if, like the albatross and man-of-war bird, its wings are long enough to furnish the required area in spite of their narrowness.

In steering the tail does most of the work, though a part of the work is, and the whole may be, done by the wings. Birds making quick evolutions are commonly long-tailed. The terns, goshawk, Cooper's and sharp-shinned hawks are good examples of this. On the other hand, the chimney-swift is rather short-tailed. Birds with short tails and longs legs usually trail the legs behind in flight, so that a boy of my acquaintance described a heron as "a big bird with only one tail feather, which was a yard long." The loon also, though his legs are not long, stretches them out behind him with

the webs of the feet held close together to steer him. Finally a bird that loses his tail has to learn how to steer himself. A cat-bird that I once knew, having lost his tail by accident, was hard put to tell where he was going until he learned to steer a more certain course with his wings.

In hovering, also, the tail plays an important part. Watch the humming-bird before the flower, the king-bird over the grass, the sparrow-hawk above the hole of the meadow-mouse. You will see that the tail is held full spread and nearly at right angles to the body, unless the body itself is dropped, as it often is in the humming-birds. Thus the tail holds a large part of the air fanned back by the wings, and acts as a drag on the bird to hold him stationary or nearly so.

One of the prettiest sights I ever saw was a common tern that, attracted by my fishing, came and hovered within ten feet of me, keenly curious, his scarlet bill and feet, black cap, silvery mantle, and white body gay as a picture against the blue water of the bay. For nearly a minute he held himself as stationary as if suspended on a wire, hovering with head bent down, wings partly flexed, and his long forked tail dipped almost at right angles to the body and spread so wide that it looked nearly square across the end — a position in which the forces that naturally would have borne him ahead were balanced by others that held him back.

Stopping is accomplished by both wings and tail. A bird in swift flight, wishing to check his course immediately, spreads his tail to the fullest extent, throws up his wings, and drops as nearly vertically as his momentum will permit him. Watch pigeons and you will observe that they are experts in this method of alighting. But commonly a bird merely draws in his wings, spreads his tail more or less to check his motion, and comes gliding down on an easy slant.

Aside from these necessary motions the bird has a number of tricks no more a part of flying than riding on one wheel is a part of bicycling, but very pretty sport.

We sometimes see a bird glide until his momentum is gone, when, with a stroke or two, he sends himself forward and rests on his wings till the new impulse is exhausted.

Sometimes birds play with the wind, mounting by merely turning to face it, and then sliding down the breeze a short distance, when they turn once more to the wind and let it raise them. Again one bird, the tumbler pigeon, is noted for its habit of falling backward in mid-air, a habit thought by some to have its root in the method by which wild pigeons sometimes escape the onslaught of a hawk.

But the most beautiful flight trick of all is the common one of soaring. No one knows all about it, and yet it is easy to see that under most conditions the bird is playing with a breeze, letting himself be borne up as he faces it, gliding downward a little as he wheels about the circle, which will once more bring him breast to the wind. Hawks are among our best soaring land-birds; but some sea-birds excel all others in the sport, wheeling about hour after hour on motionless pinions, keeping their course and their elevation entirely by some slight adjustment of the body or by an inclination of the tail. Sailors declare that an albatross will follow a ship for days together, circling above her without rest. It is certain that on moonlight nights the man-of-war bird may be seen for hours together floating far above the sea. Nor is a soaring bird easily disturbed. I have seen a soaring goshawk, when a bullet clipped a secondary from one of its wings, answer with its wild scream of defiance, and without haste or change of motion fill out an unbroken curve of its ascending spiral.

PROTECTION OF BIRDS BY COLOR.

BY

FANNIE HARDY ECKSTORM.

THE problem of safety, as we learned sometime ago, put a premium upon a bird whose color helped him to pass unobserved. It was a very pretty theory, but we are to see how it works in practice. When we think of the red and blue and yellow birds we know, it seems hard to realize that they are included in any such design; when we think of the odd-colored ornaments that birds wear, bands, crescents, stripes, and patches, often of the most brilliant hues, we fail to understand why such markings are not a sure clue to discovery; when we recollect how unlike the different sexes of the same bird often are, and how frequently young birds are very dissimilar to their parents both in colors and in markings, we must think that it is a poor law that does not apply to all the birds of one species, but explains the plumage of one age or sex, and leaves the others still unaccounted for.

We cannot go into all the details of this subject, — even men of science are agreed to dispute about them,[1] — but we can at least notice among the birds of our acquaintance instances where their color helps to conceal them from our eyes. If all our sparrows, for example, had blue or red backs, how much more readily we should discover them; for sparrows have a way of staying near the ground, either directly upon it, or in low bushes, or about fences, where a bright-colored back and breast would serve to distinguish them instantly. Now most of our common sparrows, we find, are dull-colored little

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[1] The reader will notice an instance of this in the articles on the Coloration of Animals in this volume. C. W.

birds varied with stripes about the back, breast, and head that seem to blend with the colors of the earth and with the grass stems they live among.

But the sparrows have cousins, like the grosbeaks, cardinals, and buntings, that are among our gayest birds, brilliant in red, blue, yellow, and striking combinations. Are these ground-birds? Not at all, they swing and sing among the tree-tops where there are green leaves about them and blue sky for a background, and the keen edge of their own color is, as it were, taken off. I have often thought, seeing an indigo bird swinging on the top of a balsam fir, that he was just the proper weather-vane for such a tree, his rich blue coat with peacocky hints of green seeming to stand exactly between the clear blue of the sky and blue green of the fir tree. And in the case of so brilliant a bird as the male scarlet tanager, the brightest color possible, unrelieved by any shading, there seems to be an advantage taken of the law of complemental colors which makes you see scarlet after gazing too steadily at green, or green by looking too intently upon scarlet. He cannot be hidden, and yet you do not see him among the leaves much more quickly than you would a duller-colored bird.

Another thing that has struck me is that the brightest-colored birds are found most often near civilization. You do not find the orioles and grosbeaks and tanagers so abundant away from farms and gardens. Why this is so I cannot tell you now; all we wish to infer from it is that their colors evidently do not expose them to so much danger that they avoid men; in some way they either blend with their surroundings or are able to take care of themselves in spite of their brilliant plumage. They are the birds that most of all plunge into the midst of blossoms and frolic in the snowy drifts of apple and cherry blooms.

Another family of our gayest birds, the warblers, are quite commonly tricked out with yellow and green. In watching them, I have sometimes noticed how much yellow there is in the green foliage, how they accord with

leaves just opening or with leaves just fading. This is scarcely color protection, but it is color harmony, which is much the same thing.

The dull-mottled coloring of the owls, we may suppose, has less to do with their hunting by night than with their lying still by day, when in shape and color they often much resemble dead and broken branches such as abound in a forest. An owl alighting on the top of a dead stub will seem to be a part of it, he sits so stiff and shapeless, and looks so square-headed. Nearly all the sandpipers, snipe, and other shore birds are streaked or dotted upon the back with brown and buffy like the light grass stems and the dark background behind them, a coloring which often protects the sandpiper, especially the mother bird upon the nest, from observation. But the plovers, which are nearly related to the sandpipers, have plain-colored backs, so that they come under a different protective device. They are less spotted than the sandpipers, and often have dark bands, bars, or marks about the breast and head that may help to efface the outline.

When you have opportunity, notice how much the backs of nighthawks and whippoorwills look like some of the dark-spotted, night-flying moths that lie still by day under brown leaves and upon tree trunks. In the same way, these birds that hunt during the hours of dark and twilight, and crouch upon the ground or upon the branch of a tree during the day, closely resemble the surface they alight on. The back of the woodcock is quite similarly mottled. The back and sides of grouse and quail are also protectively colored.

The outline of a bird is often more readily recognized than a spot or color would be; we see the familiar line, and infer that it belongs to a bird, therefore many of the bird's ornaments are a protection against discovery. "This makes, for instances, the mallard's dark green head tend to detach itself from his body and to join the dark green of the shady ledge, or the ruby of the humming-bird to desert him and to appear to belong to the glistening flower he is searching." In this way, bright or

strongly contrasting crown patches, throat patches, necklaces, and collars may be seen to have a use other than mere ornament, and crests often help to conceal birds by disguising familiar outlines. The cedar bird and the ruffed grouse are experts in evading notice by throwing themselves into strange attitudes and erecting their crests. Curves are what betray the bird; broken outlines or stiff lines conceal him. Therefore the ruffed grouse, when in a tree, lays all his feathers flat, stands stiffly at his greatest height, with his neck stretched as far as he can reach or crooked sharply at an angle. I have stood within two yards of a ruffed grouse, in fair sight, and that not many years since, and have decided that he was a very strange branch on a willow bush, before it flashed upon me what I was looking at.

The most beatiful arrangement for protective color is also the commonest, and though nearly every bird and animal profits by it, no man ever discovered it until a few years ago. It is called the "*law of gradation.*" Nearly every bird, you know, is lighter on the breast than on the back, and it is almost a rule that birds not uniformly colored, like the crow and the blackbirds, shall be white or gray or buffy along the belly and beneath the tail, even if they have dark breasts and throats. Why this is so, is as simple as it is interesting.

Every bird, standing in his usual positions, cuts off a portion of the light that falls from above and so casts a shadow on his own breast and under surface. We do not see the shadow, we do not know of its existence, but it is there. If the bird's breast were the same color as his back, the shadow, making it appear darker than it is (that is, darker than the back), would bring out the line of the breast sharply against the background. The shadow on a light breast cancels the effect of light upon a dark back and causes the outline to blend with the background.

Nothing could be simpler than the experiment by which Mr. Abbott H. Thayer, the artist who painted the "Madonna Enthroned" and other well-known pictures,

proved his discovery of this "law of gradation" to a large number of scientists. Any child can perform the experiment with very little trouble. We quote from the original report of the experiment: "Mr. Thayer placed three sweet potatoes, or objects of corresponding shape and size, horizontally on a wire a few inches above the ground. They were covered with some sticky material, and dry earth from the road on which they stood was sprinkled over them so that they would be of the same color as the background. The two end ones were then painted white on the under side, and the white color was shaded up and gradually mixed with the brown of the sides. When viewed from a little distance these two end ones, which were white below, disappeared from sight, while the middle one stood out in strong relief and appeared much darker than it really was. Mr. Thayer explained that terrestrial birds and mammals which are protectingly colored have the under parts white or very light in color, and that the color of the under parts usually shades gradually into that of the upper parts. This is essential in order to counteract the effect of the shadow, which otherwise, as shown by the middle potato, makes the object abnormally conspicuous and causes it to appear much darker than it really is. Some of the witnesses could hardly believe that the striking difference in the visibility of the three potatoes was entirely due to the coloring of the under side, and Mr. Thayer was asked to color the middle one like the two others in order that the effect might be observed. Mr. Thayer complied with the request, painting the under side of the middle potato white, and shading the white up into the sides as in the case of the others. The effect was almost magical. The middle potato at once disappeared from view. A similar experiment was tried on the lawn. Two potatoes were painted green to resemble the green of the grass above which they were suspended. One was painted white on the under side and at once became invisible when viewed from a little distance, while the other showed plainly and seemed very dark, the shadow, superadded to the green

of the under side, making it remarkably conspicuous. The experiments were an overwhelming success.''

Try this experiment yourself and then notice how almost invariable is this law of gradation by which Nature helps the birds and beasts to escape detection, however gayly they are colored.

SOMETHING ABOUT BEES.

BY

MARGARET WARNER MORLEY.

Miss Morley's work as an educator, a kindergartner, and an author of many books about Nature as delightful as they are instructive is well known. Birds, flowers, insects, the whole teeming life of the world yield up their secrets to her and she tells them to the world in clear and easy language.

THE queen-bee sometimes lays as many as three thousand eggs a day. . . each little egg must have a cell of comb all to itself.

You can imagine that the wax-makers and cell-builders do not have a chance to grow lazy in the busy season of egg-laying; for if the queen does not lay three thousand eggs every day, she may upon some days, and she always lays at least enough to satisfy any reasonable lover of hard work.

The cradle-cells of the drones are the same as the honey-cells, but the worker-cells are about one-fifth smaller.

You see, the workers are smaller than the drones, and so can lie in smaller cradles.

The cradle-cell of the queen is not shaped like the other cells, but somewhat like a thimble. It opens at the bottom, and is a great deal larger.

From "The Bee People." By Margaret Warner Morley. Copyright, 1899. By A. C. McClurg & Co. By permission.

The queen goes about and lays an egg in each cell. She first puts in her head and examines the cell with her antennæ, as if to make sure it is all right.

This done, she deposits an egg in the bottom of the cell. She lays two kinds of eggs, one kind being what we call fertilized, the other kind unfertilized. The fertilized eggs always hatch into workers or queens, the unfertilized always hatch into drones. The queen is able to fertilize the eggs, or not, as she pleases.

As soon as an egg is laid, the queen pays no further attention to it. It is now the turn of the nurse-bees. The nurse-bees are the younger ones that have not yet gone out of the hive.

For about three days after the egg is laid, you could see no change in it.

Perhaps you think it needs no attention, but a hen would not think so. *She* knows that eggs have to be kept warm in order to hatch, and so she sits on her own eggs with her feathers tucked down warm all about them. Miss Apis, too, understands that eggs need to be kept warm. She has no feathers, but she has a warm little fuzzy body, and when the eggs are laid, she and her sisters cluster over the comb to keep them warm.

The ancients held a good many wrong ideas, and a good many right ones, about bees, and our Latin friend Pliny was not altogether wrong when he said bees sat upon their eggs like hens.

In about three days the eggs hatch, but not into pretty downy bees with gauzy wings. No, indeed! If you were to see what hatches out of a bee's egg you would not imagine that queer thing could ever make a bee. It is a little white atom, with no legs and no wings, and looks like a maggot. It may not look like a bee, but still it is a baby bee.

If you do not like to call it a bee, you may call it a *larva*. For *larva* is the name we give to the first form of an insect after it leaves the egg.

This little larva is born hungry, and the kind nurse-bees, knowing that, feed it with plenty of — what shall I

call it? Bee-milk, perhaps. This bee-milk is manufactured by the nurses in glands in their heads; it is very nutritious, and is the same as the royal jelly with which the queen is fed. They place the food in the cell with the larva, and watch to see that it always has enough. They feed it with honey and pollen as it grows older; and how it does eat!

In a few days it has grown so large that it almost fills its cradle-cell.

It would not do to let this ravenous infant grow entirely out of bounds, but I doubt if you could guess what the nurse-bees do to prevent it. They simply stop feeding it.

That is certainly a sure way to check its growth; only most babies, if treated so, would make up their minds that life without dinner was not worth living, and would die right off.

But bee-babies do not die; they wait to see what will happen next.

It would take a long time for anybody but a bee to guess what happens next.

It is rather a peculiar performance, but Miss Apis's performances are usually peculiar.

She caps over the cell of the baby-bee.

It would be difficult to imagine an easier way of disposing of a baby, — bottle it up like a jar of pickles or a cell of honey.

It is not much trouble to take care of *such* babies.

They only need to be kept warm. Meantime, the infant thus disposed of spins for itself a soft little silken night-cap.

You see, it has nothing else to do. It cannot get anything to eat, and they do not give it so much as a rubber ring to bite on, as far as I know; so it amuses itself spinning a night-cap, or a soft little cocoon, about the upper part of its fat little bottled-up body.

Some babies might cry under the circumstances; but I doubt if this baby could do that even if it wanted to, for how *could* it cry with its mouth full of silk?

The silk for its cocoon comes out of its mouth, strange to say, — or rather out of a little hole in its lip, — and I have no doubt it is great fun for it to draw out the fine thread and spin.

Then it changes its shape. You see, it is really an infant Miss Apis, so we cannot be surprised that it should perform in queer ways, even at that tender age.

It changes from a larva into a pupa.

If you do not know what a pupa is, it is time you did.

It is the same as a chrysalis.

You see, it is not a larva, nor yet a perfect insect, but something halfway between the two.

When Baby Apis becomes a pupa, she does nothing more wonderful than butterflies and many other insects do, — for they too become pupæ on the way to being grown up, just as we become boys or girls on the way to being men or women.

You may like to know that larva is a Latin word, and means *ghost,* or *mask,* for the larva is, in one sense, the ghost or mask of the perfect insect.

But what do you think pupa means?

It, too, is a Latin word, and means *doll.*

The pupa of insects is generally inactive, and does not seem to be alive, though, of course, it is alive, and so it is called a doll, or image of the insect.

Baby Apis remains a pupa for several days, then she makes up her mind that if they want to keep other babies in bottles, they may, but as for her, she has had enough of it, so she puts up her mouth and gnaws a hole the shape of a crescent in the cap they put over her, and probably peeps out to see the world, — rather a dark world in the hive, one would think.

Then she puts out her head.

Then out she comes, a lovely young bee, light-colored and downy, and with beautiful gauzy wings.

The cap that is put over the young bee is very porous, so the air can get in. Baby Apis may be bottled up with safety, but she must not be deprived of air, for if she is she will die.

The queen-bee is hatched from an egg exactly like that of the worker-bees. But this egg, as we know, lies in a large cell, and when it hatches, the nurse-bees fairly stuff the queen larva with food.

The worker infants get very little bee-milk; they have to eat honey and bee-bread, but the queen infant is fed almost entirely upon this precious food, this "royal jelly."

It is because she eats so much of this that she develops into a queen. Sometimes the queen in a hive dies or gets lost. Then what do you suppose the workers do? Why, go to work and make a new queen, of course.

It is a terrible thing for a hive to be without a queen, and the bees are very unhappy when it happens. But if they have eggs or very young larvæ they need not despair.

They enlarge a worker cell in which lies an egg or a very young larva, by tearing down the cells next to it. Then they feed the infant thus promoted to royalty upon queen's food, and, lo! the little creature becomes a queen.

Drones get much more royal jelly than workers, but no amount of feeding or starving will make them anything but drones.

It takes all the eggs three days to hatch, but the queen larva attains its growth in five and a half days, while it takes the worker six, and the drone six and a half.

The queen spins her cocoon, changes into a pupa, and comes forth a perfect bee all in seven and a half days, while it takes the worker twelve days and the drone fourteen and a half to complete these changes.

If you do a little sum in addition, you will find that it takes sixteen days for an egg to become a queen-bee, twenty-one days for it to become a worker, and twenty-four days for a drone egg to become a drone.

As soon as the worker-bees hatch out, they go to work. . . They take care of the queen, following her about and feeding her with royal jelly whenever she is hungry, which is very often.

They seem to be very fond of their hive-mother; and

you will always see a little cluster of bees about her, caressing her with their antennæ, and paying her the greatest respect.

The workers also take care of the eggs and the young bees, but do not generally lay any eggs themselves; only the queen does that.

They make wax, build comb, and keep the hive clean, carrying out dead bees, or anything that does not belong in it.

No doubt they watch at the door, too. For bees keep sentinels on guard to see that thieves and robbers do not come in and steal their honey.

If you knock on a hive, the sentinels will fly out to see what is the matter.

In a few days the young bees leave the home work to the newly hatched, and go forth to gather honey, and pollen, and bee-glue.

You ought to know that bee-glue is called *propolis,*— a word that means "before the city,"— and it is so named, because the bees use it to build fortifications in time of war.

Certain moths attack bee-hives by crawling in and laying their eggs in the corners. When the eggs hatch, the little caterpillar-like larvæ that come out of them eat the comb and spoil the honey. To keep them out the bees sometimes build walls of propolis just inside the hive door, making the entrance so narrow that only one bee can pass at a time. In this way the sentinels are better able to keep out the intruders.

Bees have been known to use propolis in strange ways. You know they chink up all the holes with it and glue the frames fast. Once, so the story goes, they glued a snail to the bottom of the hive. His snailship had crawled into the hive and the bees fastened his shell tightly to the floor. So, for going where he was not wanted, he found his house converted into his sepulchre.

Another story is of a mouse that went into a bee-hive. The bees stung him to death, but he was so large they could not remove him, so what did they do but cover him

all over with propolis. Safe under the resinous bee-glue, his body could do no harm.

Bees breathe as well as other creatures; they take in pure air and give out impure. They do not do this by means of lungs, as we do, but through little holes in their sides. They cannot live without fresh air, and you can well imagine that a house as crowded as theirs needs careful ventilation.

They cannot lower the windows, because they have none, and they would not dare open any if they had them, for all sorts of creatures would come flying, and creeping, and running, and stealing in to get their precious honey.

The only openings to the hives, as we know, are the little holes at the bottom where the bees go in and out. How, then, do they get fresh air?

You will not be surprised to learn that Miss Apis has solved this problem in a very ingenious manner.

The only possible way of ventilating a hive through the little holes at the bottom is by fanning or pumping the air in and out.

The bees fan a current of air through the hive, by standing near the entrance holes and buzzing with their wings.

The buzzing sound is made by the rapid motion of the wings, and even one bee can cause quite a little breeze. When a number of them stand together just inside, and sometimes also just outside the hive, and fan, they produce currents of air strong enough to keep the crowded hive perfectly ventilated.

Bees are more careful to have plenty of fresh air than are people. Huber discovered that the air in the hive is nearly as pure as the air out of doors, and we should have reason to feel proud if our public buildings were as well ventilated as are the bee-hives.

One cannot go on adding several thousand members a week to one's family without sooner or later being obliged to enlarge the house — or move out. The Apis people move out.

As soon as a young queen comes out of her cell, the old queen packs up, so to speak, and prepares to depart.

She does not carry as much luggage as the Queen of England carries when she goes from Buckingham Palace to the Isle of Wight.

She merely gathers up her thousands of eyes, her shortish, but still valuable tongue, her basketless legs, and other personal possessions and starts off, taking with her most of the old bees in the hive, and leaving behind the young queen with the young bees and the honey-comb, and the brood comb full of eggs and larvæ and pupæ.

She is very generous to the young queen, who of course is her own daughter, and leaves all the furniture and silver spoons and everything of that sort behind.

Away she goes, with her faithful followers surrounding her in a dense swarm.

The whole swarm goes careering through the air like a small cyclone, and I for one should not like to stand in its path.

Some say the bees send out scouts to find a good place before the swarm starts, either a hollow tree or some other convenient shelter, or else they go into a nice new hive if somebody has been watching and has one ready.

Into the new home they go, and to work they go; and in a little while you would never suspect the family had recently moved in, so busy and so thoroughly at home do they all appear.

They build new combs, make new honey and bee-bread, and just as soon as the cells are ready the queen continues her egg-laying. Meantime all is not fair weather in the old hive.

The new queen, although just out of her cell, understands her business perfectly, and is quite capable of going about it, but there are complications. Hers was not the only queen cell in that hive.

There were others. And now, just as she has ascended the throne with the old queen peaceably out of the way, the succession being accomplished without opposition, lo and behold! she hears a sound,—a sound that probably sends the blood to her heart, and causes her very toes to tingle.

The sound she hears is not that of cannon afar, nor of

drum-beats in the distance, but it might as well be, for it is the piping of another young queen just about to come forth from its cell.

The throne is not secure, after all, for there is another queen to dispute it.

Of course there are ways of disposing of rivals to the throne, or there used to be, as any one who has read the early history of England knows.

You may smother them in a tower, or poison them, or do something of that sort.

Bees know how to smother bees that they hate, and they know how to poison them, but queen bees prefer to fight like queens for their thrones, and not get them by stealth or by striking in the dark; that is, if the rival is already out of her cradle.

If a second queen hatches out of her cell before the first young queen finds her, there is a fight.

The workers stand around and watch the conflict, but they never interfere, nor have I ever heard that they take sides and cheer their own candidate.

The combatants seize each other with their jaws, and clasp each other with their feet, trying in every way to thrust the fatal poisoned dagger into a vital part, — that is, into the soft parts between the rings of the abdomen, or where the neck joins the thorax, or the thorax the abdomen, — all these places being soft and allowing a dagger that is thrust into them to reach the inner vital parts.

At length the fatal thrust is given: One of the queens is victor; the other lies dead upon the field of battle. The workers carry out the dead body, but whether they mourn I cannot say. Certainly they do not have a grand funeral. I suppose it would not be exactly polite to the victorious queen to show too much sorrow for the vanquished one.

Evidently our queen considers one such display of courage quite enough to establish her royal character, for she does not waste time fighting any more queens, but goes to the remaining queen cells, pulls off the caps where

the bottled-up queen babies lie, and sticks her dagger right into their poor, soft, helpless little bodies.

After she has stung all the baby queens she puts up her dagger, very likely determined never to put anything so valuable to such a use again, for you remember her sting is also her ovipositor.

She does not lose it when she stings a bee, because the parts where the sting enters are so soft that she can pull it out again; but you can imagine what a sad wound the barbs make when pulled out.

Workers never sting a queen. If a strange queen is put into the hive, or flies in by mistake, and they do not want her, they gather about her so closely as to smother her to death, but they will not sting her.

Only queens sting queens.

If there should happen to be a good many bees still in the hive after a swarm leaves, the workers will not allow the queens to fight, but surround them and keep them apart until the older queen can be sent off with another swarm.

If the hive is very much crowded, the bees may swarm out of it several times in one season.

When all is serene within the hive, if the day is fair, the young queen takes an airing.

She does not have an escort, but goes alone to view the beautiful world outside the hive.

Huber was the first to discover that she flies up into the blue sky, where she meets a drone, who is her mate. He fills her pocket, which she carries on purpose, with pollen, not flower-pollen, but bee-pollen. This pollen lasts as long as she lives, and she uses it to fertilize the queen and worker eggs.

So you see the drone is not so useless as he seems. Indeed, if it were not for him, there could be no workers and no queens.

When she has taken her airing, Queen Apis goes home, and she never leaves the hive alone again. In fact, she never leaves it at all, except at the end, when she goes off with a swarm.

As the season wears on, the workers take counsel together. Winter is coming, and what *will* become of them all if the supplies give out?

There must be no more mouths to feed than necessary. The queen, of course, must be taken care of, and so must the workers; but there are the drones, perhaps hundreds or even thousands of them. They are no longer of any use: they bring in no honey; they do no work: they only endanger the lives of the whole family by eating up the winter food, so these little brown workers, on the plea of necessity, send the drones to the happy hunting grounds.

Whether they are sorry about it or not I do not know; but, in any event, they fall upon their poor brothers and sting them to death, or else drive them from the hive, where they soon die from cold, exposure, and hunger.

In late summer you will sometimes see a disconsolate drone sitting on a flower, very likely grieving at the bitterness of his lot.

Miss Apis, it seems to us very cruel of you to treat your brothers so.

But we must remember that bees are not people, and that what would be very wicked in us may be perfectly right in them.

The worker-bees labor very hard through the summer, so that sometimes they wear themselves out in a few weeks, and die.

Those hatched later in the season live through the winter, and are all ready to begin work as soon as the flowers come in the spring.

Bees spend the winter clustered together in the hive, and are then so inactive that they seem to be scarcely alive.

When bees go out from the hive for the first time to gather nectar, they are very smooth and fine-looking.

But they, too, grow old. Their pretty velvety down wears off, and their wings become broken and ragged. I do not think they turn gray or get wrinkles in their faces, but they certainly do get to wear very shabby-looking wings.

Drone

1.—Development of the Butterfly, showing caterpillar and chrysalis.

2.—Life and work of the Honey-bee, showing the comb, the honey, the propolis, the wax, the cells and the various kinds of bees.

SOMETHING ABOUT SPIDERS.

BY

ALICE JEAN PATTERSON.

THE Spinners are neighbors of ours. They set up their housekeeping in our yards and gardens, in our barns and cellars, and sometimes in the best rooms of our houses. They are skilful little architects and builders, but they are so quiet and even wary about their work that few people ever succeed in catching them at it.

We must visit them in their homes to find out what they do and how they do it.

Here is Mrs. Epĕ-ī-ra Vulgaris, who lives in the garden. She is often called the garden spider, but I suppose she has no more right to the name than a dozen other Spinners who live in the same place. She builds her house in open spaces among the vines of the grape arbor, or the branches of trees; sometimes she swings it far above your head among the leaves of the woodbine which cover the back porch.

She is a shy little body, and cares nothing whatever about making your acquaintance. Indeed, she prefers to keep out of your sight, so she tucks herself away in her private chamber and stays there all day long, coming out to her living-room among the vines only after sunset. But even the twilight shows us that she is a very pretty little lady, dressed in a dainy pink gown with brown and white trimmings.

Like all the rest of the Spinner family, Mrs. Epeira has but two distinct divisions to her body. The foremost part is the head and chest combined. If we wish to be very exact, we must call this the cephalo-thorax. The

From "The Spinner Family." By Alice Jean Patterson. Copyright, 1903. By A. C. McClurg & Co., Chicago. By permission.

hinder portion is the abdomen. This is almost five times as large as the cephalo-thorax.

Small as the front division is, all of Mrs. Epeira's legs are attached to it, and that means no small thing, for she has no less than four pairs. No wonder she can glide down her rope ladder so fearlessly when she has eight feet and legs with which to hold on!

Every leg is made up of seven pieces or segments. The first round segment, called the coxa, attaches the leg by means of a firm membrane to the under side of the body. The coxas of the eight legs form an oval surrounding the sternum or breast of Mrs. Epeira.

Next to the coxa comes another small, roundish segment, then a long, strong one, the femur. The next two segments look as if they really belonged together as one, with a bias seam across the middle. The last, pointed segment is the foot, or tarsus.

But really we must have a peep at this many-jointed leg under the microscope before we can see all of the interesting things that it has to show us. There it is, clothed from coxa to toe with hairs, all extending downward toward the foot. Some of them are fine and soft as silk, while others are stiff and bristling like small dark thorns.

At the end of the foot you see three hooked claws, as sharp as those of your cat. Besides these, there are a number of small ones so fine and sharp that they make you think of a bunch of tiny needles. These are called spines. Surrounding both claws and spines is a covering of long, stiff hairs.

You are wondering what Mrs. Epeira does with her eight feet and legs and her twenty-four sharp claws. In the first place she runs very rapidly; with four pairs of legs to carry her I suppose she ought to run four times as fast as you do with one pair. Then she performs all sorts of athletic feats that she never could do if it were not for her numerous hooked claws. These help her to climb up a vertical wall, or to run along one of her tight-rope walks, without any fear of tumbling off.

Then, too, she never could cling as she does to the filmy lace hub of her house if it were not for these dainty hooks. And above all, she never could build her wonderful house of silk without the aid of these same tools, which serve so many purposes.

She uses her feet to help to hold her food up to her mouth while she eats her dinner, for you know she has no fingers with which to hold it.

Her first pair of legs serve as feelers, just as the antennæ of a grasshopper or a butterfly do. She waves them about to discover whether or not any danger lies in her way.

How would you like to carry a clothes-brush around with you every minute? That is what Mrs. Epeira does. She is a very neat little lady, and if you watch carefully you will see her brushing the dust from her pink gown, and even from her face and eyes, with the soft brushes of hair that she carries on her legs.

There are some other ways in which these interesting feet and legs are made to serve their owner. You notice that they are pretty long for such a small body. When you visit the Lady Spinner in her home you will see that the length of the legs makes it easy for her to spread out her weight over a large space, so she runs no risk of breaking down the delicate walls of her house.

Then, too, there are times when Mrs. Epeira must walk with part of her legs, hold the thread that she cuts with another part, and help to weave with another, all at the same time. So you see she finds enough to do to keep even eight feet and legs busy.

As we look again at Mrs. Epeira she seems to have another pair of legs, a short pair in front of all the others. Have we made a mistake after all, Mrs. Epeira, and have you ten legs instead of eight?

She only wriggles around and shakes her house a little, as much as to say, "Find out for yourself if you can, for I will not tell you."

That is just what we expect to do, Mrs. Spinner. If

those short appendages are not legs, we shall find out what they are and what they are good for.

There, she has skipped across the entire length of her dining-room, and I am sure she does not use them to run with. Now she has caught a dusty little miller for her supper. Oh, Mrs. Epeira, your secret is out! You are using those foot-like projections to hold the little insect close to your mouth while you eat it.

So these appendages are not feet, but belong to Mrs. Epeira's mouth parts and are called palps, or feelers.

This Lady Spinner's mouth is very, very different from yours. Instead of having teeth and tongue on the inside, as you have, her teeth, and tongue too, are outside of her mouth, so all of her food must be chewed before it goes inside. This being true, she could never get along without her palps to hold the food in just the right place while she is chewing it.

Each palp is made up of six segments instead of seven — the number, you remember, which we found in the legs. Instead of three claws at the end, there is but one. The segment nearest the body is flat and strong. It is toothed on its inner margin like a saw. This segment and its mate on the other palp form a pair of small jaws called maxillae. These jaws move back and forth like a pair of scissors, crushing the food.

You would think that one pair of jaws was enough for Mrs. Epeira, but it is not. She has another pair, much larger and stronger than the maxillae. These are the mandibles, or true jaws. Look her straight in the face, and you see the mandibles, like a pair of cylinders, fastened to the front of her head. These are furnished on the inner margins with the same kind of saw-teeth that you saw on the maxillae.

But this is not all. At the tip of each mandible, Mrs. Epeira carries her weapons. For you must know that all the Spinners make their living in the old-fashioned way, by hunting or trapping. That being the case, they must carry about with them some sort of weapons with which to kill their prey. The weapons are strong spears,

sharp enough to pierce through the skin of any insect the Spinner may capture.

I am afraid you will think Mrs. Epeira is a dreadful little savage, for she poisons her spear before she strikes with it. At the tip of each spear is a tiny opening, so small that you cannot see it without the aid of a microscope, and yet it is large enough to allow a jet of poisonous liquid to pass into the wound made by the sharp point. In this way the immediate death of the prey is insured. The liquid is secreted in a small bag, or gland, which is concealed in the upper part of the mandible. A tiny duct carries the liquid from the gland to the tip of the poison-fang.

Mrs. Epeira never uses her sharp weapons just for the fun of killing things. She uses them when she is hungry, to kill insects for her food, or to defend herself against the attack of an enemy.

If you were to catch her in your hands, she might try to punish you by piercing your finger with her poisonous weapon. And I am sure no one would blame her if she did. However, if that should happen, you need not be alarmed, for although the poison makes quick work of killing flies and other insects, it will have but little effect on you. It may make your finger smart or burn for a short time, in much the same way that the sting of a wasp or a bee would serve you.

But remember this, that in spite of all the bad stories you may have heard about Spinners trying to bite people, no Spinner will ever use her poison-fang on you if you do not first attack her and compel her to bite you in self-defence.

When Mrs. Epeira has captured her prey, she sets about chewing it up with all those pointed teeth on her mandibles and maxillae. She chews for hours at a time. There is good reason for this, for no Spinner ever eats any solid food; everything must be reduced to the liquid state before it is sucked into the mouth with the thin lips.

When you remember Mrs. Epeira's eight feet, her four jaws, and her numerous claws, you will not be surprised

to learn that this extravagant little lady possesses no less than eight eyes.

Eight eyes ought to enable one to see very well indeed, but the truth is that all Mrs. Epeira's eyes are not of so much service to her as your two are to you. They are so small that at first glance you are inclined to believe she has no eyes at all. A closer look reveals the dainty jewels set tastefully in the front part of her cephalo-thorax.

They are arranged two on the top of her head, two in front just above the mandibles, and two very close together at each outer corner of the cephalo-thorax.

It is a good thing for Mrs. Epeira that her eyes are scattered about so that she can see in every direction, for you know she can never turn her head around to see what is going on behind her.

These tiny eyes are of the kind called simple eyes. They cannot see long distances, as the wonderful compound eyes of the flies and other insects can. They are near-sighted; that is, they can see only those objects that are within a few inches, or at best a foot of Mrs. Epeira's body. They never give her the image of an entire object at one time. When you come near the little Spinner, she sees but a small portion of you, yet that is enough often to frighten her away. What would she do if she could see what a great giant you really are?

After all, eight eyes are not too many when they are very small, simple ones.

But Mrs. Epeira and all her kindred have other ways of finding out things in the world. They can hear as well as see. Just how they manage to hear without ears is not so easy to understand. However, those who have made a careful study of the Spinners believe that some of the fine hairs on the palps act as hearing organs. Other hairs serve as the organs of smell.

Although Mrs. Epeira can see, and hear, and smell, she does not depend on any of these senses half so much as she does on her sense of touch. Most of the hairs on her legs, and those scattered over her body, are sensitive

hairs, so sensitive that she knows instantly the moment you touch any part of her silken house.

It is this wonderful sense that tells her not only that an insect has entered her home, but the exact spot where it is to be found.

Indeed, Mrs. Epeira's sense of touch is as good as a hundred eyes, for it enables her to work just as well in the darkness as in the light. And that means a great deal to her, for she does almost all her building under cover of the night.

The appendages we have found thus far, legs and palps, jaws and eyes, have all been fastened to Mrs. Epeira's cephalo-thorax. But attached to her abdomen is the most wonderful of all this little Spinner's possessions, that is, her spinning-machine.

The abdomen itself is large and round, and is fastened to the cephalo-thorax by a small stalk. On its upper surface are a number of queer little markings that look as if some one had tacked the skin fast to something on the inside. And really that is about what has happened, for these dents are the spots where the ends of the muscles on the inside are fastened to the walls of the body.

The spinning-machine is found near the end of the abdomen on the under side. It is composed of six blunt projections that resemble finger-tips. These are called spinnerets, or sometimes spinners. Every spinneret is pierced at the end with hundreds of tiny, tube-like openings. It is through these tubes that the delicate silk for Mrs. Epeira's weaving is drawn out.

On the inside of the abdomen, just above the spinnerets, is a bunch of little pouches or sacs. From each pouch a small duct leads to one of the tube-like openings on the spinnerets. These pouches are glands that secrete a clear, watery liquid. This means that a portion of the food eaten by Mrs. Epeira is digested or changed into a peculiar fluid which is stored away in these tiny pouches.

When this little lady is in need of some silk, she gently

presses her spinnerets against an object and forces a small amount of the fluid through the tube openings. This adheres to the object and then she moves her spinnerets in just the right way to draw the liquid from the tubes. The instant the liquid meets the air it is hardened into a thread.

If you have ever examined an ordinary sewing-thread you know that it is made up of a great many small strands twisted together. That is why it is so strong. Mrs. Epeira knows well enough that one of the delicate threads drawn from a single tube is too slight to be of any use to her, so she dexterously holds the fingers of her spinning machine close together, and in just the right position, so that the hundreds of dainty strands are united into one firm thread, strong enough to support Mrs. Epeira's own body.

A strange thing about the spinnerets is that they do not all contain the same kind of silk; therefore Mrs. Spinner rarely uses them all at the same time. When she wishes to use one sort of silk she spins with one set of the finger-tips. When she decides that she needs another kind she skilfully changes to another set, and goes on with her work with scarcely a pause. She never makes a mistake, never uses the wrong kind, and never mixes up the different sorts.

Years and years ago, your grandmother and great-grandmother stood by their spinning-wheels and spun woolen and cotton threads. As they spun they deftly drew out with their hands the long threads, so there would be no danger of breaking or tangling. Now Mrs. Epeira has no hands with which to draw out her threads, but she has something just as good. The claws on her feet take the place of fingers. With these dainty tools she ingeniously guides her thread, carrying it out to one side, keeping it from adhering to surrounding objects, and fastening it where she wishes it to be. Sometimes she uses her claws to draw the threads from the spinnerets.

Now and then the skilful little Spinner wishes to use a band of silk instead of a strong thread. When that is the case she holds her spinnerets apart so that the hundreds of threads unite side by side instead of twisting together, and the band is made.

ANTS AND THEIR HONEY-COWS.

BY

EDMUND SELOUS.

A DROP of honey, or something like it, is the connecting bond between the ant and the Aphis. It is exuded by the latter through certain tubercles which are situated at the end of the abdomen, and is, of course, the product of the endless quantities of sap, which, so long as it lasts, these insects are for ever pumping up and swallowing from the plant they inhabit. This honey, or honey-dew, to use the more special name bestowed on it, the ants want, but they are not content with drinking it whenever it issues from its manufacturers, in natural course. This is not sufficient, and they have learned to increase the flow of so valued a beverage by their own efforts — in other words, they milk the Aphides, which thus become their cows. To do this they tap them with their antennæ, softly and gently, on the sides of the abdomen — a quick little shower of touches. Under the influence of this probably pleasant sensation the Aphis becomes willing to part, and, raising the abdomen, "teems her refreshing dew" in a drop from the tip of it. This action of the ants cannot, in Europe, be successfully imitated, at least it has not been, and if an ant is not forthcoming the fluid is contained in the body of the Aphis until necessity compels its being ejected. Prob-

From "The Romance of Insect Life." By Edmund Selous. London.

ably the ants, if delayed in their visits, are missed by the Aphides, as a cow misses her milker, and long before they do excrete, as the process is called, they would perhaps have done so had they felt able. The sensation no doubt of the ant's antennæ on the abdomen has become, through usage, the almost necessary stimulus to the act produced by it.

The above remarks are best illustrated by a quotation from Darwin, which, in my opinion, should always be given in any general account of the relations of ants and Aphides. "I removed," says Darwin, "all the ants from a group of about a dozen Aphides on a dock plant, and prevented their attendance during several hours. After this interval I felt sure that the Aphides would want to excrete. I watched them for some time through a lens, but not one excreted. I then tickled and stroked them with a hair in the same manner as well as I could, as the ants do with their antennæ; but not one excreted. Afterwards I allowed an ant to visit them, and it immediately seemed, by its eager way of running about, to be well aware what a rich flock it had discovered; it then began to play with its antennæ on the abdomen first of one Aphis and then of another; and each, as soon as it felt the antennæ, lifted up its abdomen and excreted a limpid drop of sweet juice, which was eagerly devoured by the ant. Even the quite young Aphides behaved in this manner, showing that the action was instinctive, and not the result of experience. It is certain, from the observations of Huber, that the Aphides show no dislike to the ants: if the latter be not present, they are at least compelled to eject their excretion. But, as the excretion is extremely viscid it is no doubt a convenience to the Aphides to have it removed; therefore, probably, they do not excrete solely for the good of the ants."

If the reverse of this were the case, if the Aphides did excrete for the sole benfit of the ants, then, in Darwin's own opinion, the case for natural selection would be broken down, and with this there would be some better ground of reason for those who would see in relations of

this sort a set-off, as it were, against the never-ending bloodshed and rapine, accompanied with suffering in varied — often in an intense — degree, which is the very stuff out of which Nature has woven her mantle. But there can be no essential difference where the principle at work is precisely the same. So long as a creature does benefit itself, the way in which it does it, and the incidental effects of its doing so are of no consequence, it is the motive power that the philosopher has to consider, and there is little comfort — if comfort be needed — in knowing that an animal, to do itself good, is doing good to some other, when one also knows that, governed by the same incentive, it would as cheerfully prey upon that other's eye. As Hamlet says, in such a case "the readiness is all."

As an illustration of this truth here is another picture of how ants procure honey from a weaker creature that may happen to have swallowed it, when it is not to be obtained by the soft methods of persuasion. "Once upon a time," says Dr. Lincecum, "there dwelt in my yard a flourishing colony of the very smallest species of black ant," and having described how these Lilliputians found and ate some syrup belonging to the household, and were in consequence attacked by a larger and stronger species, he continues, "They" — that is the attacking party — grabbed up the heavily burdened little fellows, doubled them, and biting open the abdomen, drew out the full sac, and seemed to swallow it. Then, casting the lacerated carcase aside, they furiously sprung upon another of the panic-stricken crowd and repeated the horrid operation." Clearly, then, Nature, so long as she can attain her end, cares not by what means she attains it.

Independently of any feeling of comfort which the Aphides may experience in being milked by the ants, observation at once shows that they benefit largely, in a general way, by the attentions of the latter. It is not enough for the ants to milk their cows when they happen to meet them. They go very much farther than this, and cow-keeping is of as much importance with them as with

us. Lucky the Aphis who has a guard of ants around it, fiery warriors prepared to defend their property against all foes. None need be feared now. Let but an Ichneumon buzz, and a dozen stalwarts start to the rescue.

> "I dare thee but to breathe upon my love."
> "Fear not, sweet wench, they shall not touch thee, Kate,
> I'll buckler thee against a million."

And so they do indeed, or against any reasonable number. But there is no combination amongst these banditti. Each comes but to eat his own Aphis, and no one thinks of helping a friend. All therefore are powerless before the organised attack of so fierce a bodyguard. Whilst the ants are with them the Aphides are quite safe, and they are often permanently guarded in this way. Other ants take even more elaborate precautions for the safety of their property, placing them in stalls, where they stand, by plastering earth, etc., about the plant on which they are feeding. Lastly, others still conduct them into their own nest, where they keep them, sometimes in a chamber specially prepared for their reception, every necessary measure being taken for their proper nourishment, and, as one may say, comfort. Nay, the very eggs of the Aphides are tended by the ants, and hatch out in their own nurseries. Nor is it little for which they do all this, since, taking their size into consideration, the yield of these ant-cows each day must be much greater than that of our own — at least, I should imagine so.

It is not all ants who do these things, nor do any do all of them, but where there are Aphides and also ants, it would seem to be the exception rather than the rule for the latter to neglect them.

But Aphides, though the principal ant-cows of Europe, are not the only ones even there, whilst elsewhere various other species that have this honey-excreting property become their substitutes. "In the tropics," says Belt, in his much-observing work, "their place is taken in a great measure by species of *coccidæ* and genera of *Homoptera,* such as *Membracis* and its allies. My pine-

apples were greatly subject to the attacks of a small, soft-bodied, brown coccus, that was always guarded by a little black stinging ant. This ant took great care of the scale-insects, and attacked savagely any one interfering with them, as I often found to my cost when trying to clear my pines by being stung severely by them. Not content with watching over their cattle, the ants brought up grains of damp earth, and built domed galleries over them, in which, under the vigilant guard of their savage little attendants, the scale insects must, I think, have been secure from the attacks of all enemies." And again, the same naturalist tells us, " The pawpaw trees growing in my garden were infested by a small brown species of one of the leaf-hoppers that laid its eggs in a cottony nest on the under part of the leaves. The hopper would stand covering the nest until the young were hatched. These were little soft-bodied, dark-coloured insects, looking like Aphides, but more robust, and with the hind segments turned up. From the end of these the little larvæ exuded drops of honey, and were assiduously attended by small ants. A third ant, a cowardly species, whenever it found any young hoppers unattended, would relieve them of their honey, but would scamper away on the approach of any of the others. The latter do not sting, but they attack and bite the hand if the young hoppers are interfered with. The latter " are, when young, so soft-bodied and sluggish in their movements, and there are so many enemies ready to prey upon them, that I imagine that in the tropics many species would be exterminated if it were not for the protection of the ants."

But these leaf-hoppers had not only ants, but wasps to protect them, and there were constant skirmishes and bickerings on their account between the two. The wasp obtained the honey just in the same way as the ants — namely, by stroking the hoppers with its antennæ, and its possession of wings, more than its greater size, gave it a clear advantage over its rival. It did not grapple with the latter, even when there was only a single one to dispute its right, but, rising on the wing, and hovering

about till a good opportunity presented itself, it would dart down suddenly on the impertinent little dwarf, and strike it from the leaf or stem. So quick was this action that Mr. Belt could not determine whether it was with the feet or the mandibles that the wasp delivered its blow, but he thinks it was with the former; that is to say, the front pair of them. But in spite of its superiority in single combat, the wasp could not prevail against the numbers of the ants. If, indeed, it was first in the field, there was not much difficulty, for though the leaf would before long be found by some or other of the ants, yet the first arrivals were only pioneers, and when once they were knocked off it it had to be found again, only for a similar fate to befall the new discoverers. Often, however, the wasp would try to clear a leaf already in possession of the ants, and the way to which was known. But in this it was never successful, for though many fell, streams of others came rushing up, so that the wasp had no time to enjoy the fruits of its labours, but was obliged to keep constantly fighting, and before long was tired out. Though a giant amongst pigmies, and having wings — a sort of flying-dragon contending with an army of knights — yet it did not despise its small enemies, and evidently dreaded lest any of them should succeed in fastening on it. No doubt it knew — from inheritance, or experience, or both — that an ant clinging to a leg was a difficult thing to get rid of, and to avoid being placed in this position it never fought upon the ground — that is, the leaf — but only on the wing, in the manner described. Had it used its mandibles to bite with, the ants would have seized them, and some might have got on its body. Its sting played no part, doubtless because the small size and hard bodies of the ants would have rendered it ineffective.

We see from the above that ants are not the only insects that can make discreet use of honey-yielding creatures, though they excel all others in this respect. Wasps have also learnt to milk, if not to stall, their kine, and to wasps, it would seem, must be added — which need not

surprise us — at least one species of bee. "Fritz Muller has observed in Brazil a larva of a leaf-hopper which is used, like the Aphides by the ants, as milch cattle by a species of stingless bee. This bee is fond of oily matters, and feeds on carrion, old stinking cheese, and oil secreted by various plants. Although stingless, it possesses a very intense venom, which causes a most lively irritation of the skin." The ants, therefore, have rivals in this industry, and possibly such rivalry may exist to an extent hitherto unsuspected.

THE ANT-LION.

BY

CHARLES J. MAYNARD.

Mr. Maynard worked on his mother's farm, studied nature from his earliest youth, and by his hard work and investigations has become recognized as one of the leading Naturalists of New England. Birds and Butterflies have largely occupied his attention, but he has added to our stock of knowledge of Shells and Sponges also. He is the author of "The Naturalist's Guide" and many other valuable books.

THE ant-lion is not a formidable creature, being one of the insects which by its skill is able to make a reasonably good living on ants and other small fry that come to its net, the net being a neatly excavated pit. What is known of the ant-lion is usually stated at less than a page and experience has shown that the text-books have errors that they might correct.

A number of little pits in the sand in Florida seemed to be deserted, but on dropping a bit of twig into one of them I found that there was a creature there that reached out and seized it. Near my summer home on Cape Cod I found the same kind of pits, and there I began the study of the insect and returning to Newton I brought some

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fifty which were homed in a sand-garden protected by netting.

The ant-lion is the grub or lava of one of the lace-winged flies and in this state of existence is a hairy insect. The hairs and the legs point forward, which seemed an anomaly until it was found that the creature always moves backward. If held in the hand this little "bug" exerted a surprising strength and could escape quite readily from the hand through the gap which the little finger leaves when closed against the palm. The ant-lion is armed with formidable jaws, but it does not bite. It has no indication of wings and it has no mouth. There is no aperture at all that in any way corresponds to the mouth of other insects or other creatures. After considerable investigation in which dissection had its part, it was found that the jaws or horns are hollow, and have holes near the tip. These horns are plunged into the ant or other creature and the juices are extracted by a curious kind of pump operating within the jaws. The creature, therefore, while seemingly inactive is all the time vigorously sucking the nutriment from its prey.

The ant-lion excavates a pit in the loose sand which is perhaps a couple of inches in diameter, the sides sloping at an angle of forty-five degrees, and the ant, stepping on the loose slopes slips down away. The ant-lion is always somewhere near at hand. He does not always stay at the bottom of the pit as has usually been asserted, but sometimes wanders about through the loose sand. When the ant makes his misstep, it gives the alarm to the ant-lion and he hurries at once to the bottom of the pit. His progress has repeatedly been noted by watching the movements of the surface sand, and in this subway course it is able to make nearly as good progress as if on the surface. If the ant has not fallen to the bottom of the slope, the lion throws at him or above him grains of sand, which start him down again, and when once within the reach of the ant-lion, the jaws reach forth and he disappears beneath the surface of the sand. The lion, when away from his pit, has repeatedly been seen

wandering about under the sand, to reach up and seize an ant or other insect which was walking over the surface in just the same manner as it does when at the bottom of the pit. The food of the ant-lion is not exclusively ants, but it was found that scarcely any small insect came amiss to them when they were hungry, small locusts, bugs, beetles, flies and even small caterpillars were dragged down beneath the sand and their fluid contents eaten.

From the curious way in which the lace flies, which are the adults, are prevalent during one season with a scarcity of them for a number of years I incline to the opinion that they do not change every year, but may pass a number of years in the larval state before making their cocoons. The flies are as different from the larvæ as is possible: they have their legs developed normally and walk and fly forwards, and are nocturnal, while the ant-lions themselves like the sunlight and sleep at night like well-ordered creatures.

HOW INSECTS WALK.

BY

JOHN J. WARD.

BEFORE man's vision was intensified and instructed by the revealing power of the microscope, he might be compared to a child who had, since its earliest memory, been confined in a high tower with a distant view of the green fields. Although told that the green-colored patches in the distance were fields, yet, in truth, the child would have little or no conception of what a field really was. Then, if at some future time, when he had reached a thoughtful age, his liberty was given him, and he went towards those fields, viewed so often from his distant tower, he would at once be overwhelmed by the details of the individual plant leaves and flower

blooms that composed those sheets of evergreen he knew so well. It would then naturally follow that a careful analysis of details would have to be made, so that a new and more truthful conception of what constitutes a field should be formed.

So it was with man when the microscope first assisted him to unravel the mysteries of things organic and inorganic that surround him. And so it is to-day with the tyro who views through the microscope even the most common and familiar objects with which he feels himself well acquainted. He might, with apparent truth, reason that, by enlarging an object and revealing the details of its structure, he would better understand it, but that would be correct only in a limited degree. It would be quite true that, after those details had been analyzed and their relative values considered, he would know more about it, yet it should be remembered that, at first, the fresh details disclosed by the microscope add to the complexity rather than remove it. Let me give a practical example.

Everybody, doubtless, is familiar with the common blue-bottle-fly, and has observed its six black legs, and, probably, concluded that these terminate in six feet.

Now, if a detached leg of the blow-fly is seen by a person possessing normal vision, he would have little difficulty in arriving at the conclusion that he was looking at the leg of a fly; and if it should be viewed through a reading-glass, it would probably be even more easily distinguished as such. But now let us place under a microscope a small portion of this insect's leg, which roughly measures three-eighths of an inch in length; say we magnify the twenty-fifth part of an inch of the foot end, and see what is then revealed. I wonder how many of my readers would recognize these objects as tiny portions from the foot end of the legs of the familiar blow-fly — yet such is the fact. It will be seen that various details have come into view, which, previously, were quite unknown to us. What are these curious structures? And

what is their function? are questions that naturally follow.

In the first place, it is obvious that each foot of the blow-fly is provided with a pair of stout claws. These are of service to the insect when walking over rough surfaces or penetrating tiny crevices quite invisible to human sight. For example, when it climbs a perpendicular wall, or walks upside-down upon a ceiling, the apparently smooth surface has sufficient roughness for these tiny claws to get a grip upon it. However, it occasionally occurs that the blow-fly has other situations to meet, where it cannot use these hooked claws to any advantage. For instance, in its casual roaming, it may alight upon the smooth surface of the butcher's scales and dishes; or, occasionally it appears to confuse the transparent window panes of the shop with the surrounding atmosphere. In the latter case, we see it butting at the glass, with alternate rambles up and down the pane, as if it were in a great state of perplexity over the inexplicable discovery that a portion of the atmosphere had suddenly become tough and hard to penetrate.

The point we need to particularly observe, however, is that the fly walks up the perpendicular, smooth glass with perfect ease, although there is here no rough surface on which its claws can find a hold. This brings us to the next point in the anatomy of the foot of this insect, namely, the two pads seen between the claws. These pads are brought into play on such smooth surfaces as that of glass and similar materials, the claws being then thrown back, one to each side, beneath the foot and out of the way; just as, when the claws are in use, the pads are lifted up between them, also to be out of the way.

These pads or flaps act by adhesion, and for a long time were thought to hold, like suckers, by forming a vacuum; but when some flies were put into a vessel from which the air was withdrawn, and the flies still adhered, it was conclusively shown that a mistake had been made; and some other explanation was necessary. Since then,

it has been observed that the under side of these foot flaps are studded with tiny hairs which exude a sticky fluid, and it has, therefore, been surmised that this secretion both expels the air from beneath the pads and at the same time gums the pads to the smooth surface. In this way it is explained that, when we find a dead fly still adhering to a window pane or frame, it secreted this sticky fluid while its strength was failing, and later became too feeble to remove its feet again. Of course, a hold of this kind would stand a considerable pull, and so it bears the weight of the fly when upside-down. When the active fly would lift its foot, it loosens the pad by rolling it off the surface from opposite sides, just as we might readily open an envelope by pulling up the flap by the point before it has properly stuck, although it would be extremely difficult to open by pulling directly from above.

Although various views in explanation of the exact use of these adhesive organs which are familiar on many other flies besides the blow-fly, and also on bees, butterflies and other insects, have been put forward from time to time, yet that given here is perhaps the most probable, and the one most largely accepted among zoölogists.

The remaining structures worthy of notice in the blow-fly's foot are the stout bristles which clothe its joints, and, also, the longer and more delicate ones termed "touch-bristles" seen nearest the pads, which are probably associated with the sense of touch, and serve to direct the insect to suitable footholds. The coarser bristles may serve a variety of purposes in the economy of the insect, acting as brushes, combs, etc., as may be observed by watching a fly arranging its toilet.

There is another variety of the pad and claw arrangement. This example is that of an ichneumon fly — a parasitic fly whose business it is to seek out plump and healthy caterpillars and carefully deposit its eggs in their bodies, its offspring eventually feeding on the substance of their caterpillar host.

Now, if the reader will think for one moment of this

insect's occupation, and then glance at its strong comb-like claws, and then consider the plump and soft bodies of the caterpillars it has to deal with, no large effort of the imagination will be required to understand how the caterpillars are persuaded into a gentle submission to the egg-depositing business, when gripped with six feet like this.

We begin now to grasp the fact that the varied and wonderful structures and modifications revealed in insects' feet when viewed by the microscope have to do with the economy of the individual insect. This fact becomes plainer still as we investigate. For example, take the head and one of the fore legs of the common flea. We see in this fore leg some extraordinary basal parts, considering it is only an insect's leg, and great muscular development — as one might expect, considering the flea's marvellous jumping capabilities — and some more of the spines and bristles so characteristic of the legs of insects. Also, we note that the feet terminate in two delicate claws, by means of which it retains its connection with the soft skin of its host.

It will be interesting to make a little comparison with the legs of this parasitic insect. Let us, for example, consider another familiar parasite, viz., the common sheep-tick — which is largely in evidence at sheep-shearing. If we compare the feet of these two parasites, we see at once the delicacy of the one compared with the other. The legs and feet of the flea are adapted for a soft-bodied host, while those of the sheep-tick are specially formed for creeping about amongst the wool on the tougher skin of the sheep.

Although fully developed insects possess only six legs, yet, in their larval or caterpillar stage, we often find them with as many as sixteen. On careful observation, however, we discover that the legs of caterpillars are of two distinct kinds. The first three pairs taper from the body, are jointed, and terminate in a claw, and these are the chief organs of locomotion. It often happens, though, that the caterpillar, while reaching out to the green

leaves on which it feeds, has to loose its hold with these first three pairs of legs, and then the hinder pairs of "pro-legs" or clasping organs come into use. These pro-legs can be lengthened out and withdrawn again, much after the manner of the "horns" of snails, and each foot is terminated with a row of horny hooks on its inner edge, which penetrate tiny inequalities of surface in the branches and leaves and so give the caterpillar a firm grip. In this manner is explained that clinging or "creepy" sensation which a caterpillar gives to the hand when it crawls over it.

Only the first thee pairs of jointed legs are legs proper, however, and these remain throughout the metamorphoses of the insect, becoming the true jointed legs of the perfect insect. The fleshy pro-legs, or clinging organs, being mere membraneous projections of the skin, disappear when the caterpillar makes its last moult, before becoming a pupa or chrysalis.

The principal swimming organs with nearly all adult aquatic insects are the hind legs, and another very beautiful and remarkable example may be instanced in the leg of the little whirlwig or whirligig beetles seen on almost any sunny day during the summer or winter in quiet nooks of rivers, carrying on their mazy turnings and whirlings on the surface of the water in most merry fashion. Of course, to carry out such manœuvres as these sudden twistings and turnings, a special organ is needed, and in this case the hinder pairs of legs are the modified structures, the joints forming a series of plates which open out and form an expanding paddle, each joint being fringed with flat hairs, which probably help to present a greater surface of the water.

Another pond insect that presents a curious leg modification, but in this instance the fore leg, is the water-scorpion — a flattened, dingy-colored insect, of sluggish habits, which is as often as not mistaken for a bit of dead leaf; and in this way it probably deceives its prey. Its method is to lie in wait until a worm or some aquatic larva comes near, and this it suddenly seizes with a fore

leg. This fore leg acts clasp-knife fashion, the broadest joint being grooved and possessing strong muscles, by means of which the bladelike portion is pulled down upon it, the victim, of course, being gripped between them.

As a concluding example, we may leave aquatic insects and consider one of subterranean habits, namely, the mole-cricket. This insect excavates its burrows by means of its marvellous fore legs, which are wonderfully specialized for the work, bringing forcibly to mind the strong hands of the familiar mole; from this feature, indeed, the insect derives its popular name.

The fore legs, like the hands of the mole, possess extraordinary strength, and those joints of the feet which in insects are usually slender have developed here into four legs and strong projections used for digging out the soil, the foot being terminated with a small joint which bears two claws.

Another feature of interest is the curious oval opening seen at the back portion of this digging organ. This is one of the ears of this insect; the hearing organs of crickets and green grasshoppers, strange to say, are found placed in this curious position below the knee.

On the opposite side of the fore leg, on the digging parts, are placed some other strong projections which point outwards and serve the insect to cut through any strong roots which it may happen to meet while making its excavations; these projections are brought in contact with similar prominences higher up the leg, the two sets forming together most efficient shears.

It is plain, then, that the wonders of anatomy exhibited by the microscope in the feet and legs of insects are not provided for mere ornamentation, but invariably serve some other and practical purpose in the economy of the insect that bears them.

SOME PROTECTIVE RESEMBLANCES IN INSECTS.

BY

EDMUND SELOUS.

THE processes of eternal change, with the changes for the better surviving, and those for the worse dying out, is what is called natural selection, and if we understand it — we can understand this, that if any kind of creature is so strong and formidable that it would be an advantage for weaker creatures to be mistaken for it, then it is not at all unlikely that some of these weaker creatures will get more and more to resemble it, until at last they are so mistaken. For instance, the common wasps, who are armed with a formidable sting, and are very skilful in using it, are not attacked by any other insect, excepting hornets, which are not common. Any fly or moth, therefore, that resembles a wasp will be generally let alone, and the more so the more it resembles it. Accordingly we do find flies and moths that look very like wasps, and live safely in consequence. Still more would it be of advantage to look like a hornet, and there is a moth so like one that it is called the Hornet-clear-wing.

On this same principle of being mistaken for something that is safe from attack or annoyance, all sorts of animals, and in a special degree insects, have come to look like various objects around them, and amidst which they live, such as stems of grass, pieces of moss or stick, leaves, flowers, and so on — some of the resemblances being more special and extraordinary. These are things which, though the eye may see, it does not as a rule dwell upon, because there are so many others round about. Who, for instance, would look at any particular blade of grass? So a bird that would pounce down upon an insect that it saw moving amongst the leaves of a tree, if there

From "The Romance of Insect Life." By Edmund Selous. London.

was no doubt that it was an insect, would not take any pains to examine what only looked like one leaf amongst many.

Thus, throughout nature we have these curious resemblances of certain creatures to certain other creatures, or to the plants or inanimate objects around them, but it is principally amongst insects that the phenomenon is met with, probably because they increase and multiply so quickly that there has been more time both for the laws of inheritance and for the great controlling one of natural selection to have come into play. Whatever is the reason, there is no doubt about the fact, which will be best illustrated by one or two salient instances. Ants, though they fall a prey to various animals larger than themselves — such as birds or ant-eaters — yet in their relations with other insects occupy a position of comparative safety, on account of their weapons and pugnacity, and, still more, of their numbers.

The river ants of equatorial Africa, and their South American representatives, the *ecitons,* are indeed, when they set out on their foraging expeditions, the terror, not only of insects, but of all animal life. "Wherever they move," says Bates, referring to the latter, "the whole animal world is set in commotion, and every creature tries to get out of their way." This, however, as they climb trees, and send out encircling columns which enclose a considerable extent of ground, is difficult, or rather, impossible, for all such as cannot fly some distance without alighting; for if an ant or two once seize upon them all is over. An insect, therefore, that cannot evade the onset of such an enemy is lucky if it has some such means of ensuring its safety as has been above referred to.

One at least thus specially favoured inhabits Nicaragua. "I was much surprised," says Mr. Belt, "with the behaviour of a green leaf-like locust. This insect stood immovably amongst a host of ants, many of which ran over its legs, without ever discovering there was food

within their reach. So fixed was its instinctive knowledge that its safety depended on its immovability, that it allowed me to pick it up and replace it amongst the ants without making a single effort to escape. It might easily have escaped from the ants by using its wings, but it would only have fallen into as great a danger, for the numerous birds that accompany the army of ants are ever on the outlook for any insect that may fly up, and the heavy flying locust, grasshoppers, and cockroaches have no chance of escape."

This locust resembles a green leaf which, as we have seen, was a very protective resemblance indeed. It might, however, had it been a smaller insect, have resembled one of the ants themselves, and in that case would have run about with them, pretending or appearing to forage, also with perfect impunity. Whether the *Eciton* has such a double I know not, but various ants have. With some it is a spider that assumes their form. With others, as we have seen to a partial extent, a caterpillar, but the *Sauba,* or leaf-cutting ant — which is also the mushroom-growing one — is understudied, leaf and all, by an insect which, though the order to which it belongs has been determined, has not yet apparently received a name. "An example," says Professor Poulton, " of protective mimicry, which I believe to be more wonderful in its details and complexity than any which has been hitherto described, was observed and interpreted by my friend Mr. W. L. Sclater, in 1886, during his investigations in British Guiana. Mr. Sclater and his native servant had been collecting insects by shaking the branches of a tree over a sheet. The servant, although described as a very acute observer, saw an insect on the sheet which he mistook for one of the abundant Cooshie ants (perhaps the native name), carrying its little jagged segment of leaf over its back. Mr. Sclater looked more closely, and saw that it was an entirely different insect. Its length was about that of an ant carrying its leaf. The leaf was represented by the thin flattened body of the insect which along the back is no thicker than a leaf, and terminates

in a sharp, jagged edge. The head and legs were brown, and suggested the appearance of that part of an ant which is uncovered by the piece of leaf. The jagged dorsal line, when seen in profile, evidently corresponds to the roughly gnawed edge of the fragment of leaf, for Mr. Sclater tells me that the contour of the latter is generally shaped by the mandibles of the ant rather than due to the natural margin."

The above-mentioned insect is a dweller in trees, and one might have supposed that a general resemblance to the leaves among which it moves would have been a sufficient protection for it. This probably was the beginning of the deception, which became more complex as time went on. In the leaf-like back of the insect we see probably the original disguise, but as the eyes of birds became more acute they began to pierce through it, more especially when the creature walked. Round about the would-be leaf, however, the leaf-cutting ants — distasteful to birds that so affected it — were constantly moving and walking. If only it could get to resemble one of these it might be as active as it pleased, and especially if its motions, as well as its appearance, became ant — or ant and leaf-like.

And this, indeed, was what gradually began to take place. Variation was always going on, and natural selections was always at hand to mould and shape its results. The two insects were, to begin with, of much the same size, and the general leaf-like appearance of the one was a good basis on which the more particular resemblance to the cut piece of leaf, carried by the other, might be founded. A few deeper washes of brown, some not very profound modifications of contour, and an ant-suggesting legs and body began to appear beneath it. Meanwhile, however, hundreds of thousands — nay, millions — of bad or mediocre copies were swept away, the species became rarer and rarer — trembled, perhaps, on the verge of extinction; but just when it might have appeared to the birds, who were no longer able to obtain a once much-enjoyed morsel, that it really was extinct, it was

saved; nature's object had been gained. A certain number of individuals were left, were close at hand even; even now, at that very moment, one might be crawling on the same twig where a despondent bird sat, only it was not to be distinguished from a leaf-cutting ant. Such are the ways of nature, such the slaughter that attends her victories.

In Borneo, and the Malay Archipelago generally, there is a pretty pink flower known as the "Straits Rhododendron." Once a gentleman was looking at one of these flowers and admiring it, when all at once it turned round and stared him in the face. It was not a flower, but a mantis; its flattened legs — pink like them — made the petals; its abdomen, turned up over the back and held thus motionless, resembled an opening bud. "When I held the branch on which the insect had established itself in my hand I could not tell exactly where animal tissue commenced and where flower ended, so perfectly was the one assimilated to the other, both in colour and surface-texture." When once established on a flower this mantis would remain there quite motionless, if undisturbed, until it had occasion to leave it; and of course, in nature, had any insect settled on or near it, it would have instantly been seized.

The ways of the mantis are well known. "Under a most sanctimonious aspect," says Fabre, speaking of the little green one of Provence, "it hides the morals of a cannibal;" and, indeed, the female, which is larger and stronger than the male, will often turn upon the latter and devour it in the very midst of a love-passage. This it does, as in all other cases, by suddenly launching forward one or both of its fore-arms — which have been previously held in an attitude of prayer — and enclosing the body of the victim between their first and second segments, each of which is toothed along the edge like a saw. The double row of teeth meet in the body, which, held aloft, and writhing on either side of the trap, is devoured piecemeal by the mantis, who, with its sharp jaws, tears little mouthfuls out of it as long as it, or its

appetite, lasts. This process, made more interesting by the way in which it was brought about, was witnessed in the case of the above-mentioned species.

Small flies frequently settled upon it as it sat motionless, flower-like amidst flowers. "These it made no attempt either to drive off or to capture; its motions seeming rather to attract than repel them. After a short time a larger *Dipteron*, as big as a common house-fly, alighted on the inflorescence within reach of the predatory limbs. Then the mantis became active immediately; the fly was seized, torn in pieces, and devoured." Such are the real propensities of the seeming flower, and such, too, it may be observed, are those of some actual flowers — to wit, insectivorous ones.

To the Malays, however, whose minds are not yet open to the doctrines of protective or aggressive resemblance, or to evolution generally, this mantis *is* a flower, they "know not seems." The blossoms of "the *sendudok*" have become alive, and perhaps some analogies suggested by their own life-experience tempers their surprise at such an apparent change of disposition. They say, too, that few men ever see more than one flower mantis in the whole course of their lives, so rare a creature is it. In this, no doubt, they are right; yet it would be possible, perhaps, even for a Malay to see several without knowing anything about it. Native eyes are almost always sharper and better than those of the Europeans who come amongst them; but, on the other hand, no native goes about like a modern entomologist, with his eyes specially open in one direction and the possibilities of protective resemblance in his mind.

The same naturalist, during the same expedition, was singularly delighted to secure a larva, whose resemblance to a snake was "so startling accurate that I was, for a moment, completely deceived." A description follows which, as it is of that kind which deals lengthily and learnedly in details without producing any particular general effect, may be left out. It would seem, however, that this caterpillar, like many others, has the power

of withdrawing its actual head into a fold or two of its skin, which is here so marked that it performs the office of a mask, obscuring and taking the place of the real head thus obliterated. The mask is furnished with two spots, which at once become the creature's eyes, and both in colour, shape, and general appearance bear a remarkable resemblance to those of a snake; whilst a wrinkled fold, running back on either side from what appears to be the snout, suggests the mouth, and the flattened head with its characteristic arrangement of broad, flattened scales is also indicated by certain markings and colours on the required part of the caterpillar's body. An apparent head like this, thrown suddenly up as though threatening to dart forward with a hiss and distended jaws, might alarm anyone, and such a mock demonstration is evidently required to give full effects to the disguise. Thus we are told that "when the larva was moving about with the anterior segments well expanded the resemblance to a snake was not so startling; but directly it was touched the terrifying attitude was assumed, the anterior segments being drawn in and the front of the body turned towards the aggressor. When, at the same time, the hinder part of the body was hidden by leaves the deception became complete, and if effective enough to deceive, even temporarily, a human being, it must surely be equally effective in deterring less highly organised and timid foes."

For the "timid" certainly, but for the "less highly organised" the conclusion does not seem so plain. No sight is better than a bird's, and it is practice that makes perfect in any particular direction. Still, unless we suppose the disguise to be accidental merely — and this no one with a knowledge of the whole subject can do — the object of it seems clearly apparent, and we may, therefore, assume that, on the whole, it is successful — to the extent, at any rate, of keeping the species in existence.

Another large snake-resembling caterpillar was found by Bates in the forest of Brazil, and the likeness was sufficiently striking to alarm several people to whom he

showed it. In England, according to Professor Poulton, there is an excellent example of this kind of protective resemblance. This is no other than the caterpillar of the elephant hawk-moth, which by withdrawing its head into its body — just as does the Bornean species — produces a similar false face, with a pair, or, indeed, two pairs of fierce-looking eyes. This caterpillar feeds on the great willow herb, and when at rest keeps amongst the dead brown leaves at the base of the stem. "As soon," says Professor Poulton, "as the leaves are rustled by an approaching enemy, the caterpillar swiftly draws its head and the three first body-rings into the two next rings, bearing the eye-like marks. These two rings are thus swollen, and look like the head of the animal, upon which four enormous, terrible-looking eyes are prominent. The effect is greatly heightened by the suddenness of the transformation, which endows an innocent-looking and inconspicuous animal with a terrifying and serpent-like appearance."

With this caterpillar, since naturalists know what to call it, and there is no chance of its handing down any of their names in Latin to posterity, it has been possible to make experiments, and on the whole perhaps they have been in favour of the protective resemblance theory. The most interesting one — that I have read, that is to say — was made by Professor Poulton with a full-sized green lizard, and is thus described by him: "The lizard was evidently suspicious, and yet afraid to attack the caterpillar, which maintained the terrifying attitude in the most complete manner throughout. The lizard kept boldly advancing, and then retreating in fright; but at each advance it approached rather nearer to the caterpillar. After this had taken place many times and nothing had happened, the lizard grew bolder and ventured to gently bite what appeared to be the head of the caterpillar; it then swiftly retired, but finding that there was no retaliation it again advanced and gave it a rather harder bite. After a few bites had been given in this cautious manner, the lizard appeared satisfied that the

whole thing was a fraud, and devoured the caterpillar in the ordinary manner."

Perhaps a still more extraordinary instance of protective resemblance than any of the foregoing is that of a caterpillar which pretends to be an ant — one provided with an efficient sting, and of an irritable disposition. Here, as in the snake cases, it is by one portion of the body only that the fraud is perpetrated, but this, instead of being the front, is the hind part, in which, perhaps, it offers a unique example of the sort. The color of the caterpillar is exactly that of the ant, and whilst its extremity represents the latter's head, two black spots which are there situated bear an equally close resemblance to the eyes. The jaws are represented by the last pair of false legs or claspers, which are of disproportionate size, and can upon occasion be stretched widely apart, whilst a number of thin, tentacle-like processes, attached in pairs to the segments of the body, have all the appearance of an ant's legs and antennæ. Armed with these properties, which however, in a state of quiescence are not very recognisable, the caterpillar waits, as one may say, to have its feelings ruffled, when, by flinging the hinder part of its body into the air, each separate appurtenance begins at once to act the part assigned it, and the whole becomes a startling make-up. The head, with eyes, is jerked from side to side, the jaws gape, the legs move, the antennæ quiver, and an angry, threatening ant starts, as by magic, into being. "When," says Mr. Annandale, "the caterpillar is seen in an end-on position, or when the anterior two-thirds of the body are hidden, the resemblance is positively startling," so that "it is difficult to imagine how a lizard or a frog with a previous experience of the ant could fail to be deterred."

In the light of the above cases, that of the cuckoo-bees does not seem so very wonderful, since both the species are bees, and all or most of the members of any group or family of animals as a rule bear some resemblance to one another, since they descend from a common and not very remote ancestor. Many flies, however, have

almost as close a resemblance to various bees and wasps, whilst one of the latter is even the model for a species of cricket, which would otherwise fall a victim to it and others of its family. There is a beetle, too, so like a wasp, not only in its appearance, but in the way in which it runs about and moves its antennæ, that anyone almost would be taken in. Whether, under this disguise, it enters wasps' nests and preys upon the larvæ, as the bee-like *Volucella* flies enter the nests of the bumble-bees they imitate, I do not know, nor, I think, does anyone, but this might very well be the case. These flies, however, now I come to think of it, do not really injure the bees. It used to be the idea that they did, but lately it has been discovered that they are only scavengers, feeding on all waste products of their hosts, and even on their dead bodies should such opportunities arise. The bumble-bees on their part, seem to appreciate these services, though we are not entitled to say that they admit the flies into their nests on this account, since they probably do so owing to their likeness to themselves.

Of the walking-stick insects, which are hardly to be distinguished, even with close attention, from the grass or twigs on which they cling, everyone has heard or read, and the caterpillars, common enough in England, which remain motionless, projecting like a twig from its stem, and looking just the same as one, are almost as good instances of unconscious deception. But neither these caterpillars, nor any of the other insects that have been mentioned, do anything, except through the attitudes they assume, to produce their wonderful disguises. They have nothing to do with the cutting out of the material. They do not dress up for the part themselves. That, however, is what some caterpillars do. There is one, for instance, in Borneo, that has a number of spines arranged in pairs down its back, and on each of these spines it fixes several little buds of the plant on which it is feeding, such buds, and not the leaves of the plant, being the actual food it eats. Consequently the caterpillar, which is quite a small one, looks like a spray of tiny buds itself,

and can hardly, by possibility, be noticed amidst its flowery chaplet. The buds are not impaled on the spines, as might be supposed, but are attached to them with silk, which the caterpillar weaves for the purpose, and the whole process of the thing has been observed by the gentleman who gives the account, and who is no less competent a person than the curator of the Sarawak Museum. This is what he says: "A bud would be shorn off with the mandibles, then held in the two front pairs of legs, and covered all over with silk issuing from the mouth of the caterpillar. The caterpillar then twisted the front part of its body around, and attached with silk the bud to one of the spinous processes, and another bud would then be attached to this, and so on until a sufficiently long string — generally three or four buds — was made, when operations on another spine would be commenced. The caterpillar fed on these buds, scooping out the interior, and when not hurried, using the empty shells in preference to whole buds for its covering. When irritated it curled up, and remained thus for fifteen or twenty minutes. At other times it would sway about, looking like a branchlet blown by the breeze."

In time this caterpillar made "a silk cocoon covered with buds," but it never turned into a butterfly, for ants attacked it, and its life was nipped in the bud. It appears to be a very rare caterpillar, and nobody knows what butterfly it belongs to, or what is its full Latin name.

I really do not know whether this or another caterpillar of South America be the more extraordinary, for if the one makes itself like something, the other makes something like itself. It is a little green caterpillar having a very funny nondescript sort of shape as much like a little piece of gnawed-out leaf, left hanging to the midrib, as anything else. Such an object, however, is not one of the common ones of nature, and if it stood alone might be unrecognised or misinterpreted. The caterpillar, therefore, feeding along the midrib of the leaf, gnaws out a number of such little pieces, more or less like itself, and leaves them sticking upright along

it, attached by a point or two. All the rest of the leaf at that part of the midrib, it apparently eats, or bites away, so that there remains only the slender, bare stalk, with several bits of leaf upon it, one of which is the caterpillar. To say which bit is he is now very difficult, and it looks as if none of them were. This caterpillar is, of course, green, like the leaf he feeds on, but he is not the same colour all over. He is light above and dark below, and this exactly suits — I have it on authority — the chiaroscuro of the situation, so that, both in light and shadow, he looks for all the world like a little elongated bit of green leaf attached to the midrib by a couple of stalks. One would say, "Some caterpillars must have been eating that leaf;" but one would never think the caterpillar that had been eating it was still there.

Some of the most remarkable instances of protective resemblances amongst insects are exhibited by butterflies, one perhaps, being the most perfect existing under nature. This is the world-renowned leaf butterfly of Sumatra, and elsewhere in the Malay Archipelago. Of the great purple emperor family, it is purple on the upper surface, and gleams like a meteor as it shoots about in the rich, sun-bathed atmosphere of the tropics, its conspicuousness being enhanced by a sort of miniature, sharp-pointed swallow-tail, in which the hinder pair of wings end, and a broad, orange bar, like a sash or scarf of honor, running right across the anterior wings. It flies boldly and strongly, and when it descends upon a bush or shrub it is as though a little purple torch had shot through the foliage; but all at once, even though you see it come down just in front of you, it has vanished utterly — the torch has gone out.

A STUDY OF FISHES.

BY

H. D. REED.

WHILE observing a living fish and admiring its beauty, it will probably occur to some of us that a fish consists only of a head and tail. Yet this is not all. Between the head and tail is a part that we may call the trunk. It contains the digestive and other organs. There is no indication of a neck in a fish. Any such constriction would destroy the regular outline of the animal's body and thus retard the speed with which it moves through the water. But head, trunk and tail are not all. There are attached to the outer side of the fish's body certain appendages that are called fins.

Before discussing some of the different kinds of fishes and their habits, it will be necessary to learn something about fins, for the fins of all fishes are not alike. When a fish moves through the water, it bends its tail first to one side and then to the other. This undulatory movement, as it is called, pushes the fish's body ahead. One can observe the movements easily upon a specimen kept alive in an aquarium jar. At the extreme end of the tail there is a broad, notched fin which aids the tail in propelling and steering the body. We will call this the *tail* or *caudal* fin. In most of our common fishes there are seven fins — six without the caudal. The first of these six is a large fin situated near the middle of the back. This is the *back* or *dorsal* fin. Sometimes we may find a fish that has two dorsal fins. In this case the one nearest the head is called first dorsal and the next one behind it the second dorsal. Near the head, in a position corresponding to our arms,

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NORTH AMERICAN FISHES.

LEFT ROW.	RIGHT ROW.
Sea Bass.	Pond Pickerel.
Red Snapper.	Small-Mouthed Black Bass.
Brook Trout.	Sun-Fish.
Burgall.	Shad.
Bullhead.	Canadian Red Trout.
Mud-Fish.	Yellow Perch.

is a pair of fins which are called the *arm* or *pectoral* fins. Farther back towards the tail, on the under side of the fish, is another pair, corresponding in position to the hind legs of a quadruped. This pair is called the *leg* or *pelvic* fins. Just behind the pelvic fins is a single fin, situated on the middle line of the body. This is the *anal* fin. The pectoral and pelvic fins are called paired fins because they are in pairs. The others which are not in pairs are called median fins, because they are situated on the middle line of the body. The paired fins serve as delicate balancers to keep the body right side up and to regulate speed. They are also used to propel the body backwards. After naming the different fins of the fish in the schoolroom aquarium, it will be interesting to observe the uses of each.

On the side of the body, extending from the head to the caudal fin, is, in most fishes, a line made up of a series of small tubes which open upon the surface. This is called the *lateral line,* and acts in the capacity of a sense organ. Is the lateral line straight or curved? Does it curve upwards or downwards? Does the curvature differ in different kinds of fishes? Do all the fishes you find possess a lateral line? Is the lateral line complete in all fishes, *i. e.,* does it extend from the head to the caudal fin without a single break?

Where Fishes Spend the Winter.—As winter approaches and the leaves fall and the ground becomes frozen, the birds leave us and go farther south into warmer climates where food is more abundant. We are all familiar with this habit of the birds, but how many of us know or have even wondered what the fishes have been doing through the cold winter months while the streams and ponds have been covered with ice? Before the warmth of spring comes to raise the temperature of the streams, let us go to some familiar place in a brook where, during the summer, are to be found scores of minnows. None are to be found now. The brook shows no signs of ever having contained any living creatures. Suppose we go farther up or down the stream until we

find a protected pool the bottom of which is covered with sediment and water-soaked leaves. With our net we will dip up some of the leaves and sediment, being sure that we dip from the very bottom. On looking over this mass of muddy material we may find a fish two or three inches long, with very fine scales, a black back, a silvery belly and a blackish or brown band on the side of the body extending from the tip of the nose to the tail. This is the *Black-nosed Dace.* If specimens of this fish are caught very early in the spring, one will be able to watch some interesting color changes. As the spawning time approaches, the dark band on the sides and the fins change to a bright crimson. Sometimes the whole body may be of this gaudy color. During the summer the lateral band becomes orange. As the season goes, the bright colors gradually fade until finally, in the fall and winter, the little black-nose is again clothed in his more modest attire. A great many of the fishes, and especially the larger ones, seek some deep pond or pool in the stream at the approach of winter, and remain near the bottom. If the pond or stream is so deep that they do not become chilled they will remain active, swimming about and taking food all winter. But when the stream is very shallow and the fishes feel the cold, they settle down to the bottom, moving about very little and taking little or no food. The carp collect in small numbers and pass the winter in excavations that they make in the muddy bottom. If the debris thrown up by the water across the marshy end of a lake be raked over during the winter, one will probably find some of the smaller catfishes spending the season in a semi-dormant state.

Some interesting experiments may be tried with the fishes in the aquarium jar. Keep them for a few days where it is cold and then bring them into a warmer room and note the difference in their activity.

The Common Catfish or Bullhead.— This sleepy old fellow differs in many respects from most of our common fishes. He has no scales. About the mouth are eight long whisker-like appendages, called barbels. Perhaps

he is called catfish because he has whiskers about his mouth like a cat. Any one who has ever taken a catfish from the hook probably knows that care is needed in order not to receive a painful prick from the sharp spines in his pectoral and dorsal fins.

There is nothing aristocratic about the catfish. In warm pools and streams where the water is sluggish and the muddy bottom is covered with weeds, he may be found moving lazily about in search of food. His taste is not delicate. Animal substance, whether living or dead, satisfies him. When in search of food he makes good use of his barbels, especially those at the corners of his mouth, which he uses as feelers. The catfish will live longer out of water than most of our other food fishes. They will live and thrive in water which is far too impure for "pumpkin seeds" or bass. They spawn late in the spring. The mother fish cares for her young much as a hen cares for her chickens. When they are old enough to take care of themselves, she weans them.

The Common Sunfish or Pumpkin Seed.—Some evening just at sunset visit a quiet pool in a nearby stream. Drop in your hook baited with an "angle worm" and presently the dancing cork shows that you have a "bite." On "pulling up," you find that you really have a fish. It is a beautiful creature, too—thin flat body shaped something like the seed of a pumpkin. His back is an olive green delicately shaded with blue. His sides are spotted with orange, while his belly is a bright yellow. His cheeks are orange-color streaked with wavy lines of blue. Just behind his eye on his "ear-flap" is a bright scarlet spot. This is the common *Sunfish* or *Pumpkin Seed.* He is a very beautiful, aristocratic little fellow, "looking like a brilliant coin fresh from the mint."

Keep him alive in an aquarium jar with a shiner. Compare the two fishes, as to the size and shape of their bodies and fins. Feed them different kinds of foods, such as worms, insects and crackers, and try to discover which they like best and how they eat.

The sunfishes prefer quiet waters. They lay their eggs

in the spring of the year. The male selects a spot near the banks of the stream or pond where the water is very shallow. Here he clears a circular area about a foot in diameter. After making a slight excavation in the gravel or sand, the nest is completed. The eggs are then deposited by the female in the basin-like excavation. He watches his nest and eggs with great diligence, driving away other fishes that chances to come near.

The Black Basses.—The black basses are not usually found in small streams where it is most pleasant for teachers and pupils to fish. They are fishes that seek the rivers and lakes. There are two kinds of black bass, the *Large-mouthed* and the *Small-mouthed.* As the name indicates, the two may be distinguished by the size of the mouth. In the large-mouthed black bass the upper jaw extends to a point behind the eye, while in the small-mouthed species it extends to a point just below the middle of the eye.

Both kinds of black bass may be found in the same body of water. The character of the bottoms over which they are found, however, differs. The small-mouthed prefers the stony bars or shoals. The large-mouthed, on the contrary, selects a muddy bottom grown over with reeds. They feed upon crayfish ("crabs"), minnows, frogs, worms, tadpoles and insects. Our black basses are very queer parents. They prepare a nest in which the eggs are deposited. Both male and female are very courageous in the defense of their eggs and young. As soon as the young fishes are able to take care of themselves the parent fishes leave them, and after that time may even feed upon their own children.

The Stickleback.— The sticklebacks are queer little fellows indeed. The slender body, extremely narrow tail, and the sharp, free spines in front of the dorsal fin, give them at once the appearance of being both active and pugnacious little creatures. The sticklebacks are detrimental to the increase of other fishes since they greedily destroy the spawn and young of all fishes that come within their reach. They build nests about two inches in

diameter, with a hole in the top. After the eggs are laid the male defends the nest with great bravery. The little five-spined brook stickleback is most commonly found in stagnant pools, shaded by trees, where the water is filled with decaying vegetable matter, — the so-called "green frog-spawn" (spirogyra), and duck weed. If you supply the sticklebacks with plenty of fine vegetable material, you may induce them to build a nest in the aquarium jar, but they must be caught and placed in the jar early in the season before they spawn.

The Johnny Darters.— In New York State, every swift stream which has a bed of gravel and flat stones ought to contain some one of the Johnny darters, for there are a great many different kinds. They are little creatures, delighting in clear water and swift currents where they dart about, hiding under stones and leaves, or resting on the bottom with their heads up-stream. The body of a darter is compact and spindle-shaped, gradually tapering from the short head to a narrow tail. The eyes are situated nearly on top of the head. The color of the darters varies greatly with the different kinds. Some are very plain, the light ground color being broken only by a few brown markings. Others are gorgeous in their colorings, it seeming as if they had attempted to reproduce the rainbow on their sides. Such kinds are indeed very attractive and are ranked with the most beautifully colored of all our common fishes. When a darter swims, he appears bird-like, for he flies through the water much as a bird flies through the air. He does not use his tail alone in swimming, as the catfish, the sunfish, the stickleback, and most of the other fishes do, but flies with his pectoral fins.

You surely must have a Johnny darter in your aquarium jar. The Johnnies are true American fishes. Though small, they face the strong currents and eke out a living where their larger cousin, the yellow perch, would perish. There are many interesting facts which may be learned from the Johnny darters when kept alive in an aquarium. When not actually moving in the water, do the Johnnies rest on the bottom of the jar or remain

suspended in the middle apparently resting on nothing, as the other aquarium fishes do? When a fish remains still in the middle of the jar he does so because he has a well-developed air-bladder to help buoy him up, and when a fish dies it is the air-bladder which causes him to turn over and rise to the top. Now if the Johnnies always rest on the bottom of the jar when not swimming and if one happens to die and does not rise to the top we may know that, if he has an airbladder at all, it is only a vestigial one. It would be interesting also to find out for ourselves whether a Johnny darter can really "climb trees" (I mean by trees, of course, the water plants in the aquarium jar), or if he can perch upon the branches like a bird.

The Minnows.— All the small fishes of the brooks are called minnows, or more often "minnies," by the boy fisherman. The boy believes that they grow into larger fishes. This is not true. The minnows are a distinct group of fishes and, for the most part, small ones. They do not grow to be bass or pike or sunfishes or anything else but minnows. Some of the minnows, however, are comparatively large. Two of these are the *Creek Chub* and the *Shiner*. The chub is the king of the small brooks, being often the largest and most voracious fish found in such streams. His common diet probably consists of insects and worms, but if very hungry he does not object to eating a smaller fish. During the spawning season, which is springtime, the male chub has sharp, horny tubercles or spines developed upon the snout. We are able to recognize the creek chub by means of a black spot at the front of the base of the dorsal fin.

The shiner or red-fin has much larger scales than the chub. The back is elevated in front of the dorsal fin, giving him the appearance of a hump-back. His sides are a steel-blue with silvery reflections. While the shiner is not the largest, it is almost everywhere one of the most abundant brook fishes. In spring the lower fins of the male become reddish. Like the chub, he has small horny tubercles developed on the snout.

1.—Two-Horned Rhinoceros. The name of this animal is from a Greek word which signifies Nose-Horn.

2.—The Musk Ox is much more of a sheep than an ox, and is almost entirely confined to the extreme north of our continent.

3. The Camel as "The ship of the desert" has been one of the greatest factors in the exploration of the earth's surface.

LIFE AND DEATH.

BY

MARGARET WARNER MORLEY.

WHAT do you mean by dying? What is this thing named death? What becomes of the body when it is buried; of the flower when it falls; of the plant when it has done its work? Walk through the forest in the autumn; the dry leaves rustle under foot and we call them dead leaves. Could we watch these same leaves from year to year we should find that in time they disappear. Where are they? They are fluttering, green and full of sap, in their old places on the trees; they are breaking out into the white bloom of the wild plum; they are throbbing in the heart of the wood-pigeon, and painting the sky with sunset colors.

When the leaves fell it seemed a misfortune, and those who used concerning them the dread word death did not know that they had but completed one beautiful form of life, and become free to enter into another. The carbon, hydrogen, oxygen, nitrogen, and other elements that had been so long bound into plant protoplasm let go, each one, its hold upon its neighbor, the old bond was dissolved, the freed elements eagerly formed new combinations. Our leaf is now a quantity of water, ammonia, different forms of lime, magnesia, potash, soda, acids of various kinds, and combinations of iron, as well as many other substances. Behold our leaf returned to the mineral kingdom. Though not wholly. Certain of its elements enter at once into lowly forms of vegetable life, which are lying ready to seize upon them and develop waiting spores into growing life; and still others find their way at once into the animal life.

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The leaf now finds itself in a myriad of forms, and distributes itself through life. The ammonia, the ashes, sink into the ground, and are wooed by the rootlets of the forest trees to ascend through the branches and unite with the living tissue in the buds to form next year's leaves. The rootlets of the wild grape eagerly seek the aid of these wandering leaf elements, that its branches may be clothed with verdure; the wild rose would have a share; the burdock, too, and the wood anemone wish to attract them; the birds and the insects appropriate the fruit they have gone to form; their vapor, rising through the air and condensing into clouds, adorns the blue sky and reflects the sunset hues.

And yet men talk of dead leaves, — call them dead because they would leave a stiff triangle of wood fibre and green tissue to mingle with the universe!

Thus, too, with the bird. One day it lies down and rises no more, and men would have us believe it is dead. The spirit that bound its countless cells into one harmonious whole has loosed the bond; the bird's body — its immortal body — is now free to enter other forms of life. Like the cells of the fallen leaf, the cells of the fallen bird dissolve, — they free the elements which formed them; and these elements, quite unchanged by their long captivity, joyously greet the change, enter into new and delightful combinations, and lo! our whilom bird is now a lovely bit of vegetable life, — the same atoms of carbon, hydrogen, oxygen, nitrogen, and sulphur which formed his protoplasm being happily united into the new protoplasm of the plant. Every atom of the pretty bird's body is somewhere in Nature, active as ever, — helping the flowers to bloom, the birds to sing, the bees to store up honey, the deer to run, and the little mouse to hide.

We thus see that when a body dies it is not destroyed, it but changes its form. Its countless cells, composed of the elements gathered from the air and from food, are now about to give up those elements, but not the smallest atom can be lost. Each one will be but freed to seek a new life according to its surroundings and its nature.

The all-powerful principle of life but rearranges its cells to express life in other ways. The spirit, having clothed itself in a finite form, which for a time it wore, has at length restored that form to the elements from which, cell by cell, it called it forth. The spirit, no longer needing the cell-built body, releases it, and the body finds its place in a new form of life.

The immortal spirit, free from the cell-built body, clothes itself in what unknown glory!

The immortal body, free from the controlling spirit which held it in a definite form, is shaped into what forms of wonder and beauty!

"Full fathom five thy father lies;
Of his bones are coral made;
Those are pearls that were his eyes:
Nothing of him that doth fade
But doth suffer a sea-change
Into something rich and strange."

SELF CULTURE QUESTIONS

MRS. A. B. COMSTOCK,
Prof. Nature Study, Cornell University, Ithaca, N. Y.

1. Who painted the famous picture of "Dignity and Impudence"? (p. 25.)
2. How did the Donkey convict the man of stealing? (p. 39.)
3. How does a Dog find its way? (p. 46.)
4. What is the natural food of the Monkey? (p. 54.)
5. What is the right thing to do with your pet Cats and Dogs which you leave home? (p. 71.)
6. Name some of the ways in which the Elephant is useful to man? (p. 76.)
7. What is a Mahout? (p. 79.)
8. Mr. Henty had strong opinions about Cats. What were they? (p. 84.)
9. How did a cat save the lives of a family? (p. 86.)
10. How are Cats provided with their food in England? (p. 88.)
11. Can you name some famous cats in fiction? (p. 92.)
12. In what way would you compare the Beaver with the Ant? (p. 98.)
13. To what uses does the Beaver put its tail? (pp. 99-102.)
14. How and why does the Beaver construct his dam? and when does he do it? (p. 100.)
15. How does a Beaver cut down a tree? (p. 103.)
16. What is an "outcast" Beaver? (p. 108.)
17. When do Beavers do most of their work? (p. 113.)
18. Why was a Hat formerly called a "castor"? (p. 115.)
19. What is the difference between the action of the Deer and the Moose when hunted? (p. 119.)
20. How do Moose behave in captivity when caught young? (p. 120.)
21. Describe the coloring of the Moose. (p. 121.)
22. Name some characteristics of the Virginian Deer and its uses to man. (p. 125.)
23. What is "Deer-stalking"? (p. 132.)
24. What is the wool of the Llama called? (p. 134.)
25. What are Chinchilla skins used for? (p. 135.)
26. Describe the appearance and habits of the Sea-Lion. (p. 138.)
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32. Give some other names for the Puma? (p. 153.)
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34. How does the structure of the Ant-eater enable it to get its food? (p. 156.)
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36. What main purpose is served by the tail of the Monkey? (p. 158.)
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38. What white man first saw the Kangaroo? (p. 163.)
39. What are the chief peculiarities of the Kangaroo? (pp. 164-165.)
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42. What do you know of the Cats and Dogs of Australia? (pp. 176, 177.)
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SELF CULTURE QUESTIONS

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92. What was the experiment made by Mr. Thayer to show the law of graduation as applied to protective coloring in birds? (p. 346.)
93. How many different kinds of Bees form a Honey Bee colony? Name them. (p. 348.)
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95. How do the Aphides furnish food to the Ants? (pp. 369-375.)
96. How does the Ant Lion catch his prey and how does he feed on it? (pp. 375-377.)
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